2991

THE LITTORAL ZONE BENTHIC MACROINVERTEBRATE COMMUNITIES OF 12 ACID SENSITIVE, HEADWATER LAKES IN SOUTH CENTRAL ONTARIO: LAKE SELECTION AND PRELIMINARY SAMPLING RESULTS

APRIL 1994

Ontario

Ministry of
Environment
and Energy

ISBN 0-7778-2319-5

THE LITTORAL ZONE BENTHIC MACROINVERTEBRATE COMMUNITIES OF 12 ACID SENSITIVE, HEADWATER LAKES IN SOUTH CENTRAL ONTARIO: LAKE SELECTION AND PRELIMINARY SAMPLING RESULTS

APRIL 1994

Cette publication technique
n'est disponible qu'en anglais.

Copyright: Queen's Printer for Ontario, 1994
This publication may be reproduced for non-commercial purposes
with appropriate attribution.

PIBS 2991

THE LITTORAL ZONE BENTHIC MACROINVERTEBRATE COMMUNITIES OF 12 ACID SENSITIVE, HEADWATER LAKES IN SOUTH CENTRAL ONTARIO: LAKE SELECTION AND PRELIMINARY SAMPLING RESULTS

Report prepared by:

R.A. Reid & R.E. Girard
Dorset Research Centre
P.O. Box 39, Bellwood Acres Road
Dorset, ON

S.M. David
SMD Technical Services
P.O. Box 331, Dorset, ON

ABSTRACT

The Biological Studies Unit of the Limnology Section of the Ontario Ministry of Environment (MOE) initiated a monitoring programme to assess long-term trends in the composition of benthic invertebrate communities in acid-stressed softwater lakes. This report summarizes results of the spring 1988 survey of benthic invertebrates in the littoral zones of twelve headwater lakes. The sampling protocol employed a kick-and-sweep technique to collect benthos at 5 sites in the nearshore area of the littoral zone of each lake. The survey yielded an average of 101 species per lake (range 78 to 136) and an average of 1990 individual organisms (range 891 to 3137).

We sampled water chemistry at a mid-lake reference station and at each of the five littoral benthic sites in each lake. A comparison of this data revealed that the littoral chemistry is similar to the mid-lake chemistry for all parameters with the exception of the nutrients (i.e., phosphorus and nitrogen).

We have also summarized the local geological characteristics and the climate and vegetation of the region. In addition, we provide maps of the study lakes, details of the sampling sites and an inventory of the fish species present in each lake.

TABLE OF CONTENTS

Abstract i
Table of Contents ii
List of Tables iii
List of Figures iv
List of Appendices v
Introduction 1
Study Area 1
    Climate and Vegetation 2
    Geology 2
    Chemistry 3
Methods 3
    1. Lake and Site Selection 3
    2. Sampling Procedures 4
        A. Benthos Collections 4
            i) Field Methods 4
            ii) Laboratory Processing 4
        B. Water Chemistry 5
        C. Fish Inventory Methods 6
Results and Discussion 6
    A. Lake and Site Selection 6
    B. Chemistry 7
    C. Fish Inventory Summary 8
    D. Benthos 8
    E. Diversity 9
Summary 10
Acknowledgements 12
Literature Cited 13

LIST OF TABLES

Table 1 Physical characteristics and location of the study lakes.

Table 2 Mid-lake chemistry for the 12 study lakes.

Table 3 Substrate descriptions of the 60 sites (12 lakes by 5 sites per lake).

Table 4 Fish inventory for the 12 lakes.

Table 5 Species richness and abundance data for the benthic invertebrate collection.

Table 6 Summary of the number of individuals collected in each lake at the order or sub-family taxonomic level.

Table 7 Summary of the number of species collected in each lake at the order or sub-family taxonomic level.

Table 8 Listing of the dominant benthic taxa ranked by number of individuals and number of species.

Table 9 The diversity-evenness data for the 12 lakes with the corresponding pair-wise matrix of between lake comparisons using H'. Values above the diagonal are t-values and their associated probabilities are below the diagonal.

Table 10 A comparison of the Shannon-Weiner diversities for the 109 genera from the 12 lakes.

Table 11 Listing of the species found only in one lake.

Table 12 Listing of the species common to all 12 lakes.

LIST OF FIGURES

Figure 1 Map illustrating the location of the study lakes in south central Ontario.

Figure 2 Littoral zone - mid-lake chemistry comparison for the cations and the anions.

Figure 3 Littoral zone - mid-lake chemistry comparison for alkalinity, aluminum, conductivity, dissolved inorganic carbon and dissolved organic carbon.

Figure 4 Littoral zone - mid-lake chemistry comparison for nitrate, ammonium, total Kjeldahl nitrogen, total phosphorus and pH.

Figure 5 Z-score plot of the species richness and abundance data from the spring survey of the 12 lakes.

Figure 6 A histogram of the distribution of taxa in the 12 survey lakes.

LIST OF APPENDICES

Appendix 1 LRTAP rationale and sampling protocols.

Appendix 2 Bathymetric maps of the study lakes.

Appendix 3 Lake inventory data summaries with sampling site descriptions.

Appendix 4 Taxonomic list and associated database codes.

Appendix 5 Benthic species lists for each lake.

Appendix 6 Spring 1988 benthos summary by taxonomic order or sub-family.

Appendix 7 Mid-lake and littoral zone water chemistry comparison for the spring survey.

Appendix 8 Taxonomic references used in the identification of the benthic invertebrates.

INTRODUCTION

In 1988, the Ontario Ministry of the Environment initiated a biomonitoring programme to assess long-term trends in the composition of benthic invertebrate communities in acid-sensitive, softwater Precambrian Shield lakes. This work represents the central Ontario component of the federal-provincial Long Range Transport of Airborne Pollutants (LRTAP) programme that was designed to assess regional changes in the health of inland aquatic ecosystems associated with reductions in sulphur emissions (Shaw et al. 1992). A standard set of survey protocols is currently used by members of the LRTAP programme to permit comparisons among data sets collected from six areas in eastern Canada (Appendix 1). Our goals in the LRTAP programme are: (1) to estimate common species distributions; (2) to compare relative abundances among lakes and among regions, and 3) to detect the response of invertebrates to anticipated changes in water chemistry associated with emission controls. This report describes the start-up synoptic survey for littoral benthic macroinvertebrates in the spring of 1988.

Herein we describe the physical, chemical and geological attributes of the 12 lakes, the individual sampling sites and the water chemistry. We also summarize the resultant benthic invertebrate data and information on the fish species provided by the Ontario Ministry of Natural Resources.

STUDY LOCATION

All of the study lakes are located in south central Ontario in the county of Haliburton or in the Districts of Nipissing, Muskoka or Parry Sound. The nearest major urban centres are Peterborough (120 km) and Toronto (200 km) to the south and North Bay (130 km) and Sudbury (200 km) to the north (Fig. 1). The lakes are scattered over an area that span. 78°35' to 79°52' in longitude and 45°05' to 45°34' in latitude (Table 1).

Climate and Vegetation

The range in average annual precipitation is 90-110 cm in the Dorset area (30-year record). A total of 240-300 cm of snow falls each year, generally between December 1 and April 10. January temperatures average -10 °C while in July, temperatures average 17.5 °C. Mean annual temperature is about 5 °C. Lakes are generally ice-covered from the first week of December to mid-April.

The study area is situated in the Great Lakes - St. Lawrence forest, a region characterized by white pine (*Pinus strobus*), red pine (*Pinus resinosa*), eastern hemlock (*Tsuga canadensis*) and yellow birch (*Betula alleghaniensis*). Other common species include beech (*Fagus grandifolia*), white oak (*Quercus alba*), sugar maple (*Acer saccharum*), basswood (*Tilia americana*), eastern white cedar (*Thuja occidentalis*), red maple (*Acer rubrum*), red oak (*Quercus rubra*), white birch (*Betula papyrifera*) and poplar (*Populus tremuloides*). Generally, forest stands on the north-facing slopes are coniferous, whereas south-facing slopes are characterized by deciduous trees.

Geology

The study lakes are situated on the Canadian Shield, an expanse of Precambrian bedrock. The last period of mountain building of the Precambrian period was the Grenville orogeny which formed the Grenville province, a roughly rectangular strip of land 400 km wide and 2000 km long stretching from Georgian Bay to Labrador. The bedrock of the Grenville province is granitic in composition, usually composed of granitic gneisses and migmatites with marble, quartzite, amphibolite and various igneous intrusives (pegmatites, diorites and metabasics) of less importance (Jeffries and Snyder 1983). During the Pleistocene period, four glacial advances, including the most recent or Wisconsin glaciation, have rounded and polished the rock outcrops of the Grenville province. These glacial advances lowered the relief, scoured many river and lake basins and redeposited glacial debris, including moraines, eskers, outwash sands, gravel and lake sediments. Minor till plains (i.e., continuous moraine deposits > 1 m thick) and thin till deposits (i.e., < 1 m thick) interrupted by rock ridges are the dominant surficial deposits. Several of the study lakes were submerged beneath glacial Lake Algonquin (about 10,000 years ago) and received sediment-laden glacial meltwater. (Girard et al. 1985, 1990; Reid et al. 1986, 1987; Appendix 3).

Chemistry

The conductivity, major ions and nutrients levels in the study lakes are typical of those observed in nutrient poor, low alkalinity Canadian Shield lakes. Conductivity ranges from 22 to 33 μS and the alkalinity ranges from 10 to 120 $\mu eq \cdot L^{-1}$. The pH, total phosphorus and the TKN (Total Kjeldahl Nitrogen) ranges are 5.14 - 6.8, 4 - 14 $\mu eq \cdot L^{-1}$ and 160-460 $\mu eq \cdot L^{-1}$, respectively. The sulphate range is 120-170 $\mu eq \cdot L^{-1}$. Table 2 provides additional details regarding the water chemistry of the 12 lakes.

METHODS

1. Lake and Site Selection

Twelve (12) lakes were selected from the MOE lake chemistry database to span a range of alkalinities from < 0 $\mu eq \cdot L^{-1}$ to approximately 100 $\mu eq \cdot L^{-1}$. These lakes lie within the area bounded by Parry Sound, Gravenhurst and Algonquin Provincial Park (Figure 1). Six study lakes are located in the historic Lake Algonquin basin, formed after the Wisconsin glaciation (i.e., Blue Chalk, Crosson, Hamer, Harp, Skidway and Young Lakes). The other six lie in the Algonquin/Haliburton Highands (>340 m above sea level; i.e., Clear, Cradle, Delano, Pincher, Plastic, Westward Lakes). All of the lakes are small headwater lakes (18 ha to 106 ha) that are located on the Precambrian Shield area of south central Ontario where sulphate deposition is high (0.75 - 1.25 $g \cdot m^{-2} \cdot yr^{-1}$; Neary and Dillon 1988).

In an initial survey, the field crew circumnavigated each lake and recorded the relative frequencies of various substrate types between the shore and a depth of approximately 1 m.

Five sites were then selected to include the predominant substrates; typically rocks (BDR) and boulders (BOU), cobble (COB), pebble (PEB), silt (SLT) and/or sand (CSD) with macrophytes and highly organic detritus and woody debris (LOS).

2. Sampling Procedures

A. Benthos Collections

i) Field Methods

Because of site-specific differences in habitat complexity and sampling efficacy, we collected benthic invertebrates with a kick-and-sweep method standardized to a constant period of time rather than a standard unit of area (e.g., Okland and Okland 1979). Our simple kick-and-sweep method usually collects a large percentage of all species in proportion to their abundance (Elliott 1977). However, the rationale for a fixed time rather than a fixed areal unit has been challenged because the area covered during a fixed time will vary according to the habitat and the water conditions. Consequently, fixed time sampling provides information on relative abundance and species occurrence whereas areal sampling estimates absolute abundance.

Benthic invertebrates were collected for 10 minutes at each site along a varying number of transects (0 - 1 m depth) located 5 m apart using a standard D-frame, 250 μm mesh net. On each transect the collector waded out to a depth of 1 m. The substrate was gently kicked to disturb and dislodge the surface sediment and associated detritus. The disturbed material was swept up with the net and transferred to a plastic bucket as the collector waded slowly towards the shore.

ii) Laboratory Processing

The samples were sieved through 6250 and 1000 μm mesh to separate the coarse detritus and large invertebrates from the finer material. The >1000 μm fraction and any invertebrates retained by the 6250 μm mesh were separately preserved in 70% ethanol.

After several weeks the sieved fraction was stained to assist in removing the remaining macroinvertebrates from the debris (i.e., using a mixture of 10 g of Eosin B and 10 g Biebrich Scarlet in one litre of water at the rate of 20 mL of the resultant dye solution per 1 litre of sample). The samples were stained for two days, washed, and then sorted to remove the remaining animals. The resultant samples of benthic invertebrates were identified to the lowest practical taxonomic level. In most instances, the taxonomic resolution was to the genus or species level.

B. Water Chemistry

A comparative sampling program was initiated to assess the potential differences between water chemistry in the mid-lake region and the chemical features of the littoral areas where the benthos is collected. In addition, this chemistry program was designed to assess within lake and seasonal differences to permit inferences with respect to the larger MOEE water quality database that consists of mid-lake water samples only. Prior to the collection of invertebrate samples, water samples were taken for chemical analysis. In each lake, water samples were collected from six sites. These samples consisted of a 0 - 5 m mid-lake composite and single 0 - 1 m composite samples at each of the five littoral sites. All water samples were taken from a boat to avoid disturbing the bottom sediments in the shallow littoral areas. A total volume of approximately 3 L was collected with a peristaltic pump (Masterflex Portable Sampling Pump, Model 7570) using 1/2 inch i.d. PVC tubing (Tygon R3603). The depth composites were obtained by pumping water into a 8 L polyethylene carboy while the tubing was lowered to the desired depth and raised back to the surface. Any coarse particulates in the water were removed by filtering the water through a 500 μm mesh screen positioned at the mouth of the carboy. Each depth was sampled equally by maintaining a constant rate at which the tube was lowered and raised through the water column. We were careful not to disturb the sediment with the tip of the sampling tubes at all locations during the pumping procedure.

Once sufficient water was collected, sub-samples of the water were poured into the appropriate bottles for subsequent chemical analysis. The chemical parameters include alkalinity, aluminum, calcium, chloride, conductivity, dissolved organic carbon (DOC), dissolved inorganic carbon (DIC), iron (Fe), potassium (K), magnesium (Mg), sodium (Na), nitrogen, total phosphorus, pH and sulphate (SO_4; Table 2, Appendix 7).

C. Fish Inventory Methods

The Ontario Ministry of Natural Resources (MNR) conducted lake inventory surveys of the study lakes to determine the fish species present in each lake. The fish community was sampled with various types of gear that covered a range of different habitats. This equipment included the standard experimental gill nets of various mesh sizes, 4 and 5 foot trapnets, Windermere traps and standard metal minnow traps. Seines were also used to sample fish in nearshore areas.

RESULTS AND DISCUSSION

A. Lake and Site Descriptions

The biomonitoring lakes are all small (18-106 ha) headwater lakes in 4 tertiary watersheds in south central Ontario (Table 1 and Appendix 2).

The four tertiary watersheds are:

1. 2EB - lakes in this watershed flow through the Moon River or the Go-Home River then into Georgian Bay and Lake Huron (i.e., Harp, Westward, Skidway, Young, Hamer and Pincher Lakes).

2. 2EC - lakes in this watershed flow into the Severn River then into Georgian Bay and Lake Huron (i.e., Crosson and Blue Chalk Lakes).

3. 2HF - lakes in this watershed flow into the Trent System from the Gull River and then to Lake Ontario (i.e., Clear and Plastic Lakes).

4. 2KD - lakes in this watershed flow into the St. Lawrence drainage basin via the Ottawa River and the Upper Madawaska River (i.e., Cradle and Delano Lakes).

The shoreline and nearshore substrate survey was used to identify the predominate substrate types and thereby select 5 littoral sites in each lake (Appendix 3). Our substrate classifications include detritus - a highly organic flocculent material (LOS); silt (SLT); coarse sand (CSD); pebbles (PEB); cobble (COB); boulders (BOU) and bedrock (BDR). Of the 60 sites, 19 sites are detritus dominated; 9 are detritus and coarse sand; 8 are sand and cobble and 4 sites are dominated by a detritus and cobble combination. The remaining 20 sites have unique combinations of substrate types (Table 3).

B. Chemistry

The water chemistry confirmed the soft-water nature of the lakes (i.e., conductivity 21-33 μS) ranging from low DOC (i.e., 1.2 $mg \cdot L^{-1}$; Cradle Lake) to moderately coloured (7.9 $mg \cdot L^{-1}$ Hamer Lake; Table 1). The lakes are extemely sensitive (alkalinity (ANC) <10 $\mu eq \cdot L^{-1}$) to moderately sensitive (ANC >100 $\mu eq \cdot L^{-1}$) with respect to the potential for acidification. The nutrient data (total phosphorus and nitrogen) reveal that ten of the lakes are oligotrophic (Dillon and Rigler 1975), two lakes, Crosson and Hamer, are exceptions with total phosphorus concentrations greater than 10 $\mu eq \cdot L^{-1}$.

Results of the comparison between mid-lake and littoral chemistry show that the mean of the 5 littoral sites for cations (Ca, Mg, K, Na), anions (Cl, SO_4 ; Figure 2), as well as alkalinity, aluminum, conductivity, dissolved inorganic carbon, dissolved organic carbon (Figure 3) and pH (Figure 4) are all highly correlated with the mid-lake chemistry. The variability of the littoral zone data for all of these parameters is low (see Figures 2, 3 and

4). The nutrients (total phosphorus and total Kjeldahl nitrogen) are more variable (Figure 4). Since these lakes are softwater algae dominated systems, a large part of the scatter in the regression analysis for the nutrients may be attributed to local differences in algal densities and species composition (Figure 4). In addition, variation in the chemistry at some sites may be affected by inputs from nearby streams. Both sampling and lab analytical procedures may contribute to some of the scatter in the data.

C. Fisheries

The MNR fish inventory found 27 fish species representing 10 taxonomic families in 12 lakes (Gunn et al. 1988; Table 4). Five of the study lakes support lake trout (*Salvelinus namaycush*) fisheries (Blue Chalk, Clear, Cradle, Delano and Harp); four lakes support brook trout (*Salvelinus fontinalis*) fisheries (Crosson, Harp, Plastic and Westward). The survey also found that brook trout are very rare in Plastic Lake. Three lakes contain smallmouth bass (*Micropterus dolomieui*; Harp, Hamer and Young) and one lake (Skidway) has largemouth bass (*Micropterus salmoides*). Clear Lake has the most species (12) and Pincher Lake has only 2 species (common white sucker, *Catostomus commersoni* and pearl dace, *Semotilus margarita*). A recent survey of Pincher Lake shows that neither of these species is abundant. In addition, the lake trout fishery in Delano Lake has declined dramatically over the past 20 years, although the reason for this decline is not established (Monroe and Hicks 1985).

D. Benthos

The initial kick-and-sweep survey of the littoral zone invertebrates in the 12 lakes yielded 478 species (or genera) from 34 taxonomic orders or classes (including the subfamilies of Chironomidae). The number of individual organisms ranged from 891 (Crosson) to 3137 (Pincher): mean = 1990 (Table 5). The number of species collected ranged from 78 (Cradle) to 136 (Delano): mean = 101. A summary of the abundance data for each lake is presented in Table 6. The species summary is provided in Table 7.

The total number of individuals and the total number of species from each lake were standardized to Z-scores across the 12 lakes (i.e., a mean of 0.0 and a SD of 1.0) and plotted on bivariate axes to search for groupings among the lakes (Figure 5). Harp, Delano and Hamer had more species and more individuals than the average for all lakes (i.e., 0.0 on the plot). Plastic and Young had a greater number of species, but fewer individuals than the average. Clear, Cradle and Pincher had a greater number of individuals, but fewer species. Lastly, Crosson, Blue Chalk, Westward and Skidway had fewer individuals and fewer species than the average.

The dominate taxonomic orders for each lake (Table 8) were the Diptera, Amphipoda and Ephemeroptera based on total numbers of individuals, whereas the Diptera, Trichoptera, Odonata and Ephemeroptera dominate by total number of species.

E. Diversity

The diversity indices combine information on the species richness (number of species in a sample). The Shannon-Wiener index (H') was calculated using data at the generic level of taxonomic resolution (i.e., species were combined to the genus level). The H' index was computed using the following formula:

$$H' = -\Sigma(n_i/N) \log (n_i/N)$$

where n_i is the number of individuals in genus $_i$ and N is the total number of individuals.

A high diversity index means a large number of genera were found in a sample relative to the number of individuals. A low value implies that the sample is dominated by a small number of genera. H' in this survey ranged from 1.071 - 1.682 with an average of 1.53. H' values were compared using the formulae provided by Zar (1984). These formulae involve pair-wise comparisons between H' values for each lake.

Evenness (J') or equitability also refers to the distribution of individuals with respect to the number of genera, but standardized to range from 0 to 1. The formula is $J' = H'/\log^s$ where ^{s} is the total number of genera in the sample. A value of 1.0 implies that each genera has an equal number of individuals, whereas values approaching 0.0 indicate that most of the individuals were from only in one genus. The evenness values for this study ranged from 0.579 to 0.803 with an average of 0.725 (Table 9).

The diversity indices were contrasted statistically to compare the benthic communities across the lakes (Zar 1984; Table 10). This analysis revealed several groups of lakes with similar diversities. Blue Chalk Lake was distinct from all of the other lakes with the lowest diversity index (1.071). Crosson (1.398) and Plastic (1.379) have similar diversities. Westward Lake does not differ significantly from two different sets of lakes. Westward (1.563) is similar to Clear (1.529) and Young (1.534). In addition, Westward is similar to Cradle (1.606) and Hamer (1.620). Cradle and Hamer do not differ. Finally, Harp (1.656) is similar to Pincher (1.665), Skidway (1.677) and Delano (1.682), which is the lake with the highest diversity.

In this survey, 97 species were collected from only one lake (i.e., these are classed as the rare species; Figure 6). Harp Lake had 26 distinct species while Plastic and Delano had 13 unique species (Table 11). The lakes with the fewest unique species were Crosson with 4 and Clear with 3. Thirteen (13) species and 4 unclassified genera were collected in all 12 study lakes (Table 12). These ubiquitous taxa belonged to 9 different taxonomic classifications.

SUMMARY

This report summarizes the initial biomonitoring survey conducted in the spring of 1988 as part of the LRTAP biomonitoring programme. This synoptic survey of the littoral zone benthos from 12 headwater lakes resulted in the collection of 331 different taxa. On average, 1990 organisms from 101 taxa were collected from each lake. Diversity indices calculated for the data collapsed to the generic taxonomic level ranged from 1.071 to 1.682

with an average of 1.53. Ninety-seven species were found in only one lake, whereas 13 taxa were collected from all 12 lakes.

Subsequent documents will report on the continuation of this south central Ontario component of the LRTAP biomonitoring programme. The following reports are being prepared:

1. results of a synoptic survey conducted in the fall of 1988 using the same 12 lakes with a spring-fall comparison;

2. results of synoptic surveys conducted in the fall of 1989 and 1990 with comparisons to the fall surveys of previous years;

3. statistical analyses of the data reported in 1 and 2 with comparisons among years;

4. a quality assurance/quality control (QA/QC) study examining the repeatability of the kick-and-sweep protocol;

5. a study of the chironomid taxa in the 12 lakes with an emphasis on the environmental correlates of the observed patterns in community structure; and

6. an examination of the taxa considered to be potential indicator species for the early warning of the onset of lake acidification.

ACKNOWLEDGEMENTS

This reports summarizes the initial survey of the 12 study lakes that comprise the MOEE Biomonitoring component of the LRTAP programme undertaken in collaboration with the Department of Fisheries and Oceans, Environment Canada and the Ontario Ministry of Natural Resources. We thank Greg Mierle for his supervision and direction. We also thank the many students and staff who assisted with the field collections and sample sorting. Bohdan Bilyj of Biotax identified the invertebrates. Keith Somers assisted with the data analysis. We thank Renée Morrison for her assistance with the preparation of this report.

LITERATURE CITED

Cox, E.T. 1978. Counts and measurements of Ontario lakes by watershed unit. Fisheries Branch, Ont. Min. Nat. Res. 114 pp.

Dillon, P.J. and F.H. Rigler. 1974. A test of a simple nutrient budget model predicting the phosphorus concentration in lake water. J.Fish. Res. Board.. Can. 31: 1771-1778..

Elliott, J.M. 1977. Some methods for the statistical analysis of samples of benthic invertebrates. Second Edn. Freshwat. Biol. Assoc. Sci. Publ. No. 25. The Ferry House, Ambleside, Cumbria. 160 pp.

Girard, R., R.A. Reid and W.R. Snyder. 1985. The morphometry and geology of Plastic and Heney Lakes and their catchments. Ont. Min. Envir. Data Report DR 85/1.

Girard, R., R.A. Reid. 1990. The morphometric and geologic data for nineteen lakes in the Parry Sound and Nipissing District and Haliburton County. Ont. Min. Envir. Data Report DR 90/2.

Gunn, J.M., L.E. MacKay, L.I. Deacon, T.J.Stewart, F.J.Hicks, B.P. Monroe, G.L. Beggs. 1988. Long-term Monitoring of Fish communities in Acid Sensitive Lakes in Ontario. Lake Reserv. Manage. 4 (1): 123-134.

Jeffries, D.S. and W. Snyder. 1983. Geology and geochemistry of the Muskoka-Haliburton study area. Ont Min. Envir. Data Report DR 83/2.

Monroe, B.P. and F.J.Hicks. 1985. Delano Lake Data Summary. Algonquin Fisheries Assessment Unit Report. Ont. Min. Nat. Res. 24 pp.

Neary, B.P. and P.J. Dillon. 1988. Effects of sulphur deposition on lake chemistry in Ontario, Canada. Nature. 333: 340-343.

Okland, J., and K.A. Okland. 1979. Use of fresh-water littoral fauna for environmental monitoring: aspects related to studies of 1000 lakes in Norway. pp. 168-183. In: The use of ecological variables in environmental monitoring. Edited by: H. Hytteborn. Nat. Swedish Environ. Prot. Bd., Rep. SNV PM 1151, 348 pp.

Reid, R.A. and W. Snyder. 1986. Geology of Big Porcupine, Clear, Crown, Nunikani and Sherborne catchments (Haliburton County). Ont. Min. Envir. Data Report DR 86/1.

Reid, R.A. and S.M. David. 1990. Crayfish distribution and species composition in the Muskoka and Haliburton lakes. Ont. Min. Envir. Data Report DR 90/1.

Shaw, M.A., S. Geiling, S. Barbour, I.J. Davies, E.A. Hamilton, A. Kemp, R. Reid, pp.M. Ryan, N. Watson and W. White. 1992. The Department of Fisheries and Oceans national LRTAP biomonitoring programme: site locations, physical and chemical characteristics. Can. Tech. Rep. Fish. Aquat. Sci. 1875: 87 pp.

Zar, J.H. 1984. Biostatistical analysis. 2nd edition. Prentice-Hall, Inc. NJ.

Table 1 Physical characteristics and location of the study lakes.

LAKE	SAMPLE DATE	LAT.	LONG.	COUNTY OR DISTRICT	TOWNSHIP	MAP[1]	AREA (ha)	WATERSHED CODES[2]	ELEVATION (m)
BLUE CHALK	09 MAY 88	45 12	78 56	MUSKOKA	RIDOUT	31E2	52.4	2EC15	336
CLEAR	28 APR 88	45 11	78 43	HALIBURTON	SHERBORNE	31E2	88.4	2HF8	369
CRADLE	29 APR 88	45 28	78 35	HALIBURTON	LAWERENCE	31E7	17.9	2KD18	472.4
CROSSON	21 MAY 88	45 05	79 02	MUSKOKA	OAKLEY	31E3	56.7	2EC15	312
DELANO	04 MAY 88	45 31	78 36	NIPISSING	CANISBAY	31E10	23.9	2KD1	442
HAMER	18 APR 88	45 14	79 48	PARRY SOUND	HUMPHREY	31E4	35.2	2EB5	221
HARP	25 APR 88	45 23	79 07	MUSKOKA	CHAFFEY	31E6	71.4	2EB13	327
PINCHER	05 MAY 88	45 34	78 51	NIPISSING	McCRANEY	31E10	42.1	2EB13	510.1
PLASTIC	26 APR 88	45 11	78 50	HALIBURTON	SHERBORNE	31E2	32.1	2HF10	379
SKIDWAY	20 APR 88	45 12	79 52	PARRY SOUND	CONGER	31E4	18.5	2EB2	221
WESTWARD	03 MAY 88	45 29	78 47	NIPISSING	PECK	31E4	63.3	2EB11	429
YOUNG	22 APR 88	45 13	79 33	MUSKOKA	WATT	31E4	105.9	2EB7	251.5

1- Topographic map number

2- Terrestrial watershed code from Cox 1978.

Table 2 . Mid-lake chemistry for the 12 study lakes.

LAKE	BLUE CHALK	CLEAR	CRADLE	CROSSON	DELANO	HAMER	HARP	PINCHER	PLASTIC	SKIDWAY	WESTWARD	YOUNG
DATE	09 MAY 88	28 APR 88	29 APR 88	21 MAY 88	04 MAY 88	18 APR 88	25 APR 88	05 MAY 88	26 APR 88	20 APR 88	03 MAY 88	22 APR 88
ALKTI(GRAN) ueq.L	84.7	7.8	9.4	9.0	46.6	7.2	68.3	-1.0	12.0	4.8	41.6	89.4
ALKT(TFE) ueq.L	121.9	48.6	44.6	47.4	85.3	42.6	101.6	36.7	48.2	42.4	68.5	125.7
AL ug.L	2	27	13	65	54	171	27	77	33	108	7	9
CA mg.L	2.5	2.2	1.8	2.3	2.6	2.7	3	1.6	2.0	1.5	2.1	3.0
CL mg.L	0.3	0.4	0.0	0.4	0.3	2.1	1.13	0.2	0.4	1.1	0.2	0.4
COND25 uS.cm	27.8	25.8	25.0	25.4	29.4	33.2	33.4	22.1		21.8	23.9	31.1
DIC mg.L	1.32	0.66	0.67	0.75	1.24	1.30	1.47	0.52	0.85	1.51	1.18	1.58
DOC mg.L	1.5	1.5	1.2	3.9	4.3	7.9	3.3	1.8	2.0	2.9	1.3	3.0
FE ug.L	29	44	45	330	200	350	100	78	115	320	49	87
K mg.L	0.36	0.34	0.25	0.29	0.41	0.46	0.53	0.33	0.19	0.33	0.35	0.56
MG mg.L	0.84	0.58	0.52	0.74	1.02	0.68	1.08	0.48	0.54	0.46	0.68	0.96
MN ug.L	18	63	34	34	49	48	26	54	38	140	61	50
NA mg.L	0.8	0.46	0.44	0.66	0.82	0.76	1.24	0.52	0.50	0.62	0.54	1.04
NH4 ug.L	25	33	39	19	15	55	3	55	53	102	33	9
NO3 ug.L	62	55	47	172	170	112	160	118	71	79	107	192
TKN ug.L	210	160	170	350	290	460	210	220	215	370	190	200
pH	6.76	5.74	5.66	5.55	6.12	5.14	6.3	5.39	5.64	5.26	6.06	6.47
SO4 mg.L	6.4	8.0	6.6	7.1	7.6	7.5	7.45	6.5	6.5	5.75	6.4	6.8
TOTAL PHOSPHORUS ug.L	5.3	4.6	5.2	14.0	9.1	11.0	7.7	5.9	5.5	11.75	4.0	9.5

Table 3 Substrate descriptions of the 60 sites (12 lakes by 5 sites per lake).

LAKE	SITES 1	2	3	4	5
BLUE CHALK	CSD COB	LOS	LOS	CSD/PEB LOS	CSD
CLEAR	CSD COB	CSD COB	CSD LOS	CSD COB	LOS
CROSSON	COB/PEB CSD LOS	LOS COB CSD	CSD LOS	CSD LOS	LOS COB CSD
CRADLE	LOS CSD COB	LOS	COB/PEB CSD/LOS	LOS	LOS
DELANO	LOS	LOS/COB	LOS	LOS	BOU/LOS
HARP	LOS/CSD	COB CSD	CSD COB	CSD COB	LOS COB PEB CSD
HAMER	LOS	LOS/CSD	BDR	SLT COB/LOS	LOS SLT
PLASTIC	COB LOS CSD	LOS	LOS	COB CSD SLT	LOS COB BOU
PINCHER	COB/LOS	LOS	LOS CSD COB	LOS/COB	LOS
SKIDWAY	LOS	LOS	LOS	LOS	LOS CSD
WESTWARD	LOS CSD	LOS	CSD LOS COB	COB CSD	LOS COB
YOUNG	CSD PEB SLT/LOS	CSD LOS	CSD LOS	SLT LOS	CSD LOS

1– BDR Bedrock COB Cobble CSD Coarse Sand

BOU Boulder PEB Pebble SLT Silt

LOS Highly Organic, Flocculent, Fine Particulate Substrate

Table 4 Fish inventory for the 12 lakes.

			LAKES NAME[1]											
SCIENTIFIC NAMES	DFO_CODE		BC	CL	CR	CN	DO	HR	HP	PC	PN	SY	WD	YG
Family Salmonidae														
Subfamily Salmoninae														
Salvelinus fontinalis	163	Brook Trout				P			P	P			P	
Salvelinus namaycush	166	Lake Trout	P	P	P		P		P					
Hybrid		Hybrid			P									
Subfamily Coregoninae														
Coregonus artedii	142	Cisco							P					P
Family Osmeridae														
Osmerus mordax	138	Rainbow Smelt			P					P				
Family Catostomidae														
Catostomus commersoni	26	White Sucker	P	P		P	P		P	P	P	P	P	P
Family Cyprinidae														
Phoxinus eos	71	Northern Redbelly Dace	P	P	P		P			P			P	
Couesius plumbeus	44	Lake Chub		P									P	
Hybognathus hankinsoni	47	Brassy Minnow	P											
Notemigonus crysoleucas	53	Golden Shiner	P			P				P				
Notropis cornutus	60	Common Shiner		P			P						P	
Notropis heterodon	62	Blackchin Shiner	P											
Notropis heterolepis	63	Blacknose Shiner				P							P	
Pimephales notatus	73	Bluntnose Minnow		P										P
Pimephales promelas	74	Fathead Minnow		P									P	
Rhinichthys atratulus	75	Blacknose Dace		P										
Semotilus atromaculatus	78	Creek chub	P	P	P	P	P			P				
Semotilus margarita	80	Pearl Dace		P	P		P			P	P			
Family Ictaluridae														
Ictalurus nebulosus	173	Brown Bullhead	P			P		P		P				
Family Cadidae														
Lota lota	81	Burbot (ling)	P						P					
Family Gasterosteidae														
Culaea inconstans	84	Brook Stickleback			P		P						P	
Family Centrarchidae														
Ambloplites rupestris	90	Rock Bass								P				
Lepomis gibbosus	94	Pumpkinseed	P	P		P				P		P		
Micropterus dolomieui	99	Smallmouth Bass						P	P					P
Micropterus salmoides	100	Largemouth Bass										P		
Family Percidae														
Perca flavescens	122	Yellow Perch		P		P		P		P		P		P
Etheostoma exile	117	Iowa Darter												P

1- Lakes: BC = Blue Chalk, CL = Clear, CR = Cradle, CN = Crosson, DO = Delano, HR = Hamer, HP = Harp, PC = Plastic, PN = Pincher, SY = Skidway, WD = Westward, YG = Young

Table 5 Species richness and abundance data for the benthic invertebrate collection.

LAKE	TOTAL # OF TAXA	TOTAL # OF INDIVIDUALS
BLUE CHALK	92	1610
CLEAR	94	2076
CRADLE	78	2420
CROSSON	91	891
DELANO	136	2940
HAMER	103	2299
HARP	110	2008
PINCHER	93	3137
PLASTIC	123	1067
SKIDWAY	83	2053
WESTWARD	96	1901
YOUNG	108	1512
MEAN	101	1990
RANGE	78-136	891-3137

Table 6 Summary of the number of individuals collected in each lake at the order or sub-family taxonomic level.

TAXONOMIC NAME	BC	CL	CR	CN	DO	HR	HP	PN	PC	SY	WD	YG
COELENTERATA												
TURBELLARIA		1			4							
NEMATODA	7	6			4	2	4	2			2	
OLIGOCHAETA	33	75	16	41	26	29	81	58	57	18	34	31
HIRUDINEA	1	4	2	12	5		3	9	3	2	5	
ISOPODA										37		
AMPHIPODA	596	186	376	97	430	159	360	307	99	205	650	439
DECAPODA		1									1	1
HYDRACARINA	3		1	9	50	15	24			4	2	2
COLLEMBOLA	1		3		1			1	1		1	
EPHEMEROPTERA	150	530	479	410	580	714	242	549	89	428	481	230
ODONATA	33	11	50	33	105	99	87	33	21	83	5	40
PLECOPTERA							4		9			15
HEMIPTERA	1		21	5	5	12	6	15	4	7	4	
MEGALOPTERA	2	4		4		35	1	1	5	27		4
NEUROPTERA			1									
TRICHOPTERA	19	28	53	18	64	130	29	97	29	87	26	35
LEPIDOPTERA	1	6		4			1	1	8		3	
COLEOPTERA	37	88	13	17	139	4	25	19	6	7	36	25
DIPTERA TOTAL	704	1032	1362	227	1476	1015	1039	1965	666	1113	505	657
DIPTERA:Ceratopogonidae	101	26	53	22	28	154	109	86	77	91	53	36
DIPTERA:Chironomidae	601	1005	1305	203	1444	851	917	1868	553	1020	447	617
Subfam.–Podonominae							4		2			
Subfam.–Tanypodinae	435	118	493	37	514	301	461	372	119	169	126	249
Subfam.–Diamesinae												
Subfam.–Prodiamesinae	1	1					3				4	1
Subfam.–Orthocladiinae	47	326	26	44	187	281	184	138	247	149	42	187
Subfam.–Chironominae	118	560	786	122	743	269	265	1358	185	702	275	180
Tribe–Chironomini	56	146	580	108	508	235	232	642	124	610	123	76
Tribe–Tanytarsini	62	414	206	14	235	34	33	716	61	92	152	104
DIPTERA:Tabanidae	1				1	1		1		1		
DIPTERA:Tipulidae	1			2		8	11		14			
DIPTERA:Culicidae												
DIPTERA:Misc.		1			3	1	2	10	18	1	4	4
DIPTERA–indent./terrestrial forms									4		1	
DIPTERA:Chaoboridae			4									
GASTROPODA	1	6	1		38		34		1		2	21
PELECYPODA	21	98	42	14	13	85	68	80	69	35	144	12
TOTAL INDIVIDUALS	1610	2076	2420	891	2940	2299	2008	3137	1067	2053	1901	1512

Table 7 Summary of the number of species collected in each lake at the order or sub-family taxonomic level.

TAXONOMIC NAME	BC	CL	CR	CN	DO	HR	HP	PN	PC	SY	WD	YG
COELENTERATA												
TURBELLARIA		1			1							
NEMATODA	2	1			2	2	3	1			1	
OLIGOCHAETA	7	4	3	3	8	2	7	4	5	1	3	5
HIRUDINEA	1	2	1	2	2		1	4	2	1	4	
ISOPODA										1		
AMPHIPODA	2	2	2	2	2	2	2	2	3	2	2	2
DECAPODA		1									1	1
HYDRACARINA	1		1	2	8	4	4			1	2	2
COLLEMBOLA	1		1		1			1	1		1	
EPHEMEROPTERA	7	6	5	7	5	4	5	2	3	3	7	7
ODONATA	6	6	5	8	12	11	6	6	7	11	3	4
PLECOPTERA							1		1			1
HEMIPTERA	1		5	3	3	7	3	2	4	5	2	
MEGALOPTERA	1	1		2		1	1	1	1	2		1
NEUROPTERA			1									
TRICHOPTERA	11	10	12	9	17	13	14	14	12	9	6	14
LEPIDOPTERA	1	2		1			1	1	2		3	
COLEOPTERA	3	5	3	4	7	4	4	3	4	2	5	7
DIPTERA TOTAL	45	50	45	46	61	52	49	51	72	44	50	57
DIPTERA:Ceratopogonidae	5	9	7	5	8	8	12	6	17	6	8	7
DIPTERA:Chironomidae	38	40	37	39	50	40	56	42	47	36	38	47
Subfam.–Podonominae							1		1			
Subfam.–Tanypodinae	8	6	5	6	8	6	8	6	8	6	5	7
Subfam.–Diamesinae												
Subfam.–Prodiamesinae	1	1					1				1	1
Subfam.–Orthocladiinae	10	9	9	13	14	10	20	12	18	8	10	19
Subfam.–Chironominae	19	24	23	20	28	24	26	24	20	22	22	20
Tribe–Chironomini	13	19	20	16	23	21	20	18	16	20	17	15
Tribe–Tanytarsini	6	5	3	4	5	3	6	6	4	2	5	5
DIPTERA:Tabanidae	1				1	1		1		1		
DIPTERA:Tipulidae	1			2		2	5		3			
DIPTERA:Culicidae												
DIPTERA:Misc.		1			2	1	2	2	4	1	3	3
DIPTERA–indent./terrestrial forms									1		1	
DIPTERA:Chaoboridae			1									
GASTROPODA	1	1	1		3		4		1		1	3
PELECYPODA	2	2	2	1	4	1	5	1	5	1	4	4
TOTAL SPECIES	92	94	87	90	136	103	136	93	123	83	95	108

Table 8 Listing of the dominant benthic taxa ranked by number of individuals and number of species.

LAKE	DOMINANT TAXA BY COUNT	COUNTS SPRING	DOMINANT TAXA BY SPECIES	TOTAL SPECIES SPRING
BLUE CHALK	DIPTERA	704	DIPTERA	45
	AMPHIPODA	596	TRICHOPTERA	11
	EPHEMEROPTERA	150	EPHEMEROPTERA	7
CLEAR	DIPTERA	1032	DIPTERA	50
	AMPHIPODA	530	TRICHOPTERA	10
	EPHEMEROPTERA	186	ODONATA	6
CRADLE	DIPTERA	1362	DIPTERA	45
	EPHEMEROPTERA	479	TRICOPTERA	12
	AMPHIPODA	376	ODONATA	5
CROSSON	EPHEMEROPTERA	410	DIPTERA	46
	DIPTERA	227	TRICHOPTERA	9
	AMPHIPODA	97	ODONATA	8
DELANO	DIPTERA	1476	DIPTERA	61
	EPHEMEROPTERA	580	TRICHOPTERA	17
	AMPHIPODA	430	ODONATA	12
HAMER	DIPTERA	1015	DIPTERA	52
	EPHEMEROPTERA	714	TRICHOPTERA	13
	AMPHIPODA	159	ODONATA	11
HARP	DIPTERA	1039	DIPTERA	49
	AMPHIPODA	360	TRICHOPTERA	14
	EPHEMEROPTERA	242	OLIGOCHAETA	7
PINCHER	DIPTERA	1965	DIPTERA	51
	EPHEMEROPTERA	549	TRICHOPTERA	14
	AMPHIPODA	307	ODONATA	6
PLASTIC	DIPTERA	666	DIPTERA	72
	AMPHIPODA	99	TRICHOPTERA	12
	EPHEMEROPTERA	89	ODONATA	7
SKIDWAY	DIPTERA	1113	DIPTERA	44
	EPHEMEROPTERA	428	ODONATA	11
	AMPHIPODA	205	TRICHOPTERA	9
WESTWARD	AMPHIPODA	605	DIPTERA	50
	DIPTERA	505	EPHEMEROPTERA	7
	EPHEMEROPTERA	481	TRICHOPTERA	6
YOUNG	DIPTERA	657	DIPTERA	57
	AMPHIPODA	439	TRICHOPTERA	14
	EPHEMEROPTERA	230	EPHEMEROPTERA	7

Table 9 The diversity-evenness data for the 12 lakes with the corresponding pair-wise matrix of between lake comparisons using H´. Values above the diagonal are t-values and their associated probabilities are below the diagonal.

	Diversity (H')	Evenness (J')	LAKE CODE											
LAKE NAME			BC	CN	CL	CR	DO	HP	HR	PC	PN	SY	WD	YG
BLUE CHALK	1.071	0.579	-	3.720	4.696	5.170	5.563	5.482	5.313	3.902	5.453	5.548	4.930	4.675
CROSSON	1.398	0.670	<0.001	-	2.734	3.536	4.175	4.020	3.731	1.070	4.012	4.148	3.127	2.748
CLEAR	1.529	0.716	<0.001	<0.010	-	2.510	3.613	3.358	2.845	3.465	3.348	3.568	1.656	0.601
CRADLE	1.606	0.754	<0.001	<0.001	<0.050	-	2.727	2.269	1.204	4.502	2.346	2.651	1.933	2.359
DELANO	1.682	0.778	<0.001	<0.001	<0.001	<0.010	-	1.699	2.613	5.313	1.318	0.720	3.313	3.448
HARP	1.656	0.741	<0.001	<0.001	<0.001	<0.050	<0.100	-	2.057	5.213	0.956	1.541	2.997	3.186
HAMER	1.620	0.739	<0.001	<0.001	<0.010	<0.500	<0.010	<0.050	-	4.871	2.160	2.523	2.343	2.675
PLASTIC	1.379	0.654	<0.001	<0.500	<0.001	<0.001	<0.001	<0.001	<0.001	-	5.067	5.296	3.981	3.431
PINCHER	1.665	0.789	<0.001	<0.001	<0.001	<0.050	<0.200	<0.500	<0.050	<0.001	-	1.123	3.003	3.193
SKIDWAY	1.677	0.803	<0.001	<0.001	<0.001	<0.010	<0.500	<0.200	<0.050	<0.001	<0.500	-	3.259	3.402
WESTWARD	1.563	0.752	<0.001	<0.010	<0.100	<0.100	<0.010	<0.010	<0.050	<0.001	<0.010	<0.010	-	1.490
YOUNG	1.534	0.728	<0.001	<0.010	>0.500	<0.050	<0.001	<0.010	<0.010	<0.001	<0.010	<0.001	<0.200	-

For a single comparison t=1.972 @ P=0.05; given 66 possible multiple comparisons the Bonferroni adjusted t value to maintain an overall probability of 0.05 is: t>3.340

Table 10 A comparison of the Shannon-Weiner diversities for the 109 genera from the 12 lakes.

SPRING 88

Blue Chalk	Plastic	Crosson	Clear	Young	Westward	Cradle	Hamer	Harp	Pincher	Skidway	Delano
1.07	1.378	1.398	1.528	1.534	1.563	1.606	1.619	1.655	1.664	1.677	1.682

Table 11 Listing of the species found only in one lake.

MOE IDCODE	SPECIES	LAKE	RELATIVE ABUNDANCE	MOE IDCODE	SPECIES	LAKE	RELATIVE ABUNDANCE
	TURBELLARIA				**ODONATA**		
204	Divispiculimermis sp.	CLEAR	1	1108	Boyeria grafiana	CROSSON	2
206	Hydromermis sp.	HARP	1	1112	Cordulegaster sp.	PINCHERA	1
208	Limnomermis sp.	PINCHERB	1	1116	Didymops transversa	BLUE CHALK	2
	OLIGOCHAETA			1124	Enallagma vesperum	SKIDWAY	7
302	Arteonais lomondi	HARP	1	1136	Leucorrhinia frigida	HAMER	19
306	Limnodrilus claparedianus	PLASTIC	1		**HEMIPTERA**		
320	Stylodrilus beringianus	YOUNG	1	1304	Corixidae juv.	BLUE CHALK	1
322	Tasserkidrilus harmani	DELANO	1	1310	Hesperocorixa lobata	HARP	1
328	Vejdovskyella comata	DELANO	1	1314	Hesperocorixa vulgaris	HAMER	1
	HIRUDINEA			1322	Sigara (Arcto.) penniensis	CRADLE	2
406	Haemopis marmorata	WESTWARD	1	1326	Sigara (Phaeo.) mackinacensis	CRADLE	2
412	Placobdella sp.	PINCHERB	1	1328	Sigara (Phaeo.) macropala	PINCHERB	3
	ISOPODA			1330	Sigara (Pileo.) douglasensis	HAMER	1
502	Asellus forbesi	SKIDWAY	37	1332	Sigara (Vermi.) deflecta	CRADLE	4
	AMPHIPODA				**NEUROPTERA**		
602	Crangonyx gracilis	PLASTIC	57	1502	Climacia sp.	CRADLE	1
	HYDRACARINA				**TRICHOPTERA**		
804	Arrenurus (s.str.) auricularis	HAMER	1	1610	Ceraclea alces	DELANO	1
806	Arrenurus (Mega.) apetiolatus	HAMER	1	1644	Oxyethira sp.3	DELANO	9
808	Arrenurus (Mega.) cardiacus	DELANO	1		**LEPIDOPTERA**		
812	Atractides elaenis	DELANO	1	1702	Acentria sp.	WESTWARD	1
816	Hydrodroma americanus	HARP	1	1704	Crambus sp.	HARP	1
820	Hygrobates neocalliger	HARP	1		**COLEOPTERA**		
822	Lebertia distincta	DELANO	1	1802	Agabus sp.	PLASTIC	2
832	Arrenurus (Mega.) bergei	WESTWARD	1	1818	Gyrinus latilimbus	DELANO	1
	COLLEMBOLA			1820	Gyrinus sayi (=lugens)	CLEAR	1
902	Folsomia sp.	WESTWARD	1	1824	Gyrinus ventralis?	PINCHERA	1
908	Metisotoma sp.	PLASTIC	1	1834	Macronychus sp.	HARP	1
	EPHEMEROPTERA			1836	Melyridae	DELANO	1
1002	Arthroplea bipunctata	PINCHERB	3	1838	Prionocyphon sp.	PINCHERB	1
1008	Ephemera simulans	BLUE CHALK	4	1842	Scirtes sp.2	CRADLE	2
				1844	Scirtes sp.3	HAMER	1

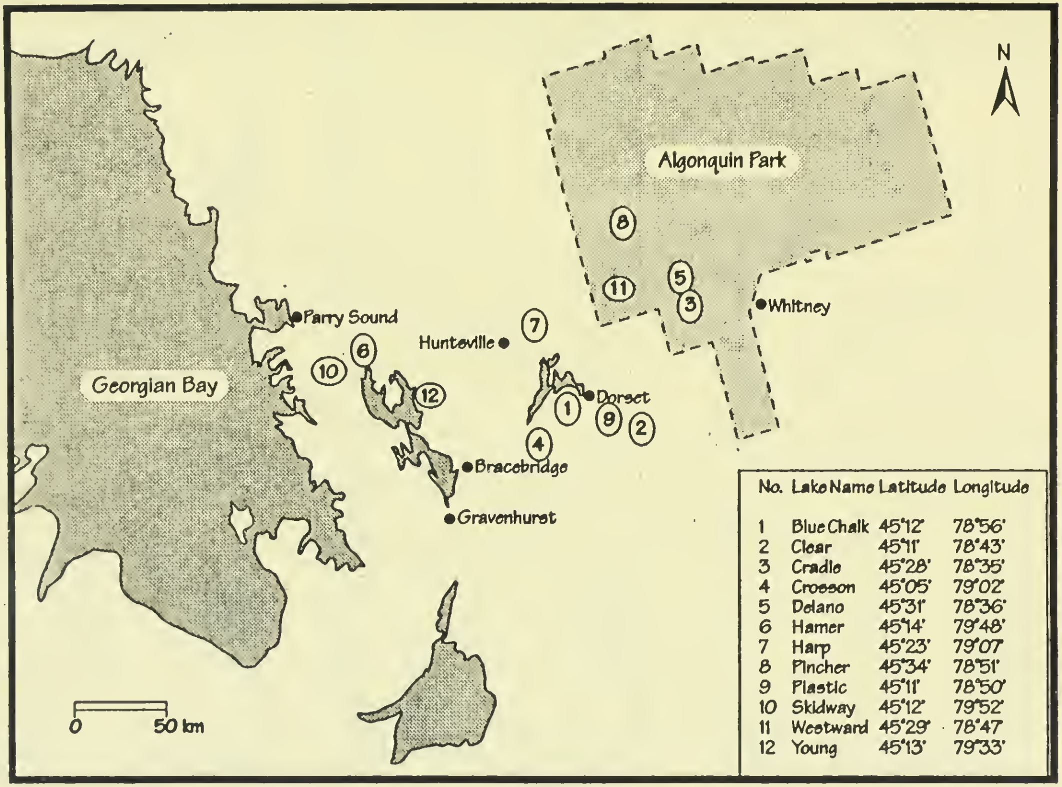
Table 11 Continued ...

MOE IDCODE	SPECIES	LAKE	RELATIVE ABUNDANCE
DIPTERA:CERATOPOGONIDAE			
2101	Alluaudomyia sp.	DELANO	11
2102	Atrichopogon polydactylus	HAMER	1
2118	Bezzia sp.7	CLEAR	1
2122	Culicoides sp.1	HAMER	2
2124	Culicoides sp.2	CROSSON	1
2126	Forcipomyia sp.	PLASTIC	1
2132	Mallochohelea sp.	HARP	2
2140	Isohelea sp.	PLASTIC	2
2152	Probezzia sp.4	SKIDWAY	1
DIPTERA:Sub-family-Tanypodinae			
2404	Apsectrotanypus johnsoni	HARP	2
2406	Brundiniella eumorpha	HARP	4
2412	Djalmabatista pulcher	HARP	1
2414	Guttipelopia guttipennis	SKIDWAY	14
2418	Labrundinia neopilosella	DELANO	8
2430	Trissopelopia ogemawi	HARP	2
2432	Zavrelimyia sp.1	BLUE CHALK	1
DIPTERA:Sub-family-Orthocladinae			
2702	Acricotopus sp.	PLASTIC	1
2704	Brillia parva	YOUNG	1
2710	Corynoneura lobata	SKIDWAY	1
2718	Cricotopus (s.str.) nr. albiforceps	PLASTIC	1
2720	Cricotopus (s.str.) sp. cylindraceus gr.	CROSSON	1
2726	Cricotopus (s.str.) sp.1 tremulus gr.	HARP	1
2734	Diplocladius sp.	YOUNG	1
2736	Doithrix sp.1	PLASTIC	1
2738	Doithrix sp.2	HARP	1
2740	Heleniella sp.	HARP	1
2748	Hydrobaenus fusistylus	HARP	1
2752	Nanocladius (s.str.) nr. minimus	CROSSON	1
2754	Nanocladius (s.str.) sp.	HARP	1
2768	Platysmittia? sp.	YOUNG	1
2782	Pseudosmittia sp.1	HARP	2
2786	Smittia sp.	PLASTIC	1
2792	Thienemanniella sp.A (ELA)	PLASTIC	3
DIPTERA:Sub-family-Chironominae			
	Tribe- Chironomini		
2904	Chironomus (Campto.) ?tentans	PLASTIC	6
2910	Cryptochironomus spp.	HAMER	1
2932	Nilothauma sp.	DELANO	3
2944	Paracladopelma undine	YOUNG	2
2946	Paracladopelma sp.1	BLUE CHALK	1
2948	Paralauterborniella nigrohalterale	YOUNG	1
2968	Polypedilum (s.lat.) sp.4	YOUNG	1
	Tribe-Tanytarsini		
3014	Tanytarsus sp. 'Pc-brush'	PINCHER	12
DIPTERA:Tabanidae			
3102	Chrysops ater	DELANO	1
3106	Chrysops sp(p).	SKIDWAY	1
DIPTERA:Tipulidae			
3202	Dactylolabis sp.	HAMER	5
3210	Ormosia sp.(1)	HARP	1
3214	Tipula (Nippotipula) abdominalis	HARP	1
3216	Tipula (Yamatotipula) sp.	HARP	1
DIPTERA:Miscellaneous			
3306	Dixidae:Dixella sp.	YOUNG	1
3308	Dolichopodidae	PLASTIC	6
3312	Phoridae	PINCHER	1
3314	Platypezidae:Platypeza sp.1	PLASTIC	1
3316	Platypezidae:Platypeza sp.2	HARP	1
3318	Ptychopteridae:Battacomorpha sp.	YOUNG	2
3320	Psychodidae?	HARP	1
GASTROPODA			
3506	Physella (s.str.) gyrina	YOUNG	4
PELECYPODA			
3614	Pisidium equilaterale	HARP	3

Table 12 Listing of the species common to all 12 lakes.

MOE IDCODE	SPECIES	MOE IDCODE	SPECIES
300	OLIGOCHAETA	2100	DIPTERA Ceratopogonidae
312	Lumbriculus variegatus	2104	Bezzia sp.1
600	AMPHIPODA	2108	Bezzia sp.2
604	Crangonyx laurentianus	2400	Subfam. Tanypodinae
606	Hyalella azteca	2402	Ablabesmyia (s. str.) aspera
1000	EPHEMEROPTERA	2408	Clinotanypus (s.str) pinguis
1012	Eurylophella temporalis	2410	Conchapelopia sp.
1032	Leptophlebia intermedia	2426	Procladius (s.lat) spp.
1100	ODONATA	2700	Subfam. Orthocladiinae
1128	Gomphus exilis	2746	Heterotrissocladius hirtapex
1600	TRICOPTERA		
1632	Oecetis sp.1	2762	Parametriocnemus lundbecki
1634	Oecetis sp.2	2774	Psectrocladius (s.str.) litofilus
		2776	Psectrocladius (s.str.) simulans
3600	PELECYPODA	2900	Tribe-Chironomini
3602	Pisidium casertanum	2908	Cryptochironomus conus
		2918	Dicrotendipes tritomus
		2920	Endochironomus nigricans
		2928	Microtendipes pedellus
		2972	Polypedilum (Tripodura) simulans
		2976	Pseudochironomus sp.2
		2986	Tribelos jucundum
		3000	Tribe-Tanytarsini
		3002	Cladotanytarsus sp.
		3006	Paratanytarsus sp.
		3016	Tanytarsus/Micropsectra spp.

Figure 1 Map illustrating the location of the study lakes in south central Ontario.



No.	Lake Name	Latitude	Longitude
1	Blue Chalk	45°12'	78°56'
2	Clear	45°11'	78°43'
3	Cradle	45°28'	78°35'
4	Crosson	45°05'	79°02'
5	Delano	45°31'	78°36'
6	Hamer	45°14'	79°48'
7	Harp	45°23'	79°07'
8	Pincher	45°34'	78°51'
9	Plastic	45°11'	78°50'
10	Skidway	45°12'	79°52'
11	Westward	45°29'	78°47'
12	Young	45°13'	79°33'

Figure 2 Littoral zone - mid-lake chemistry comparison for the cations and the anions.

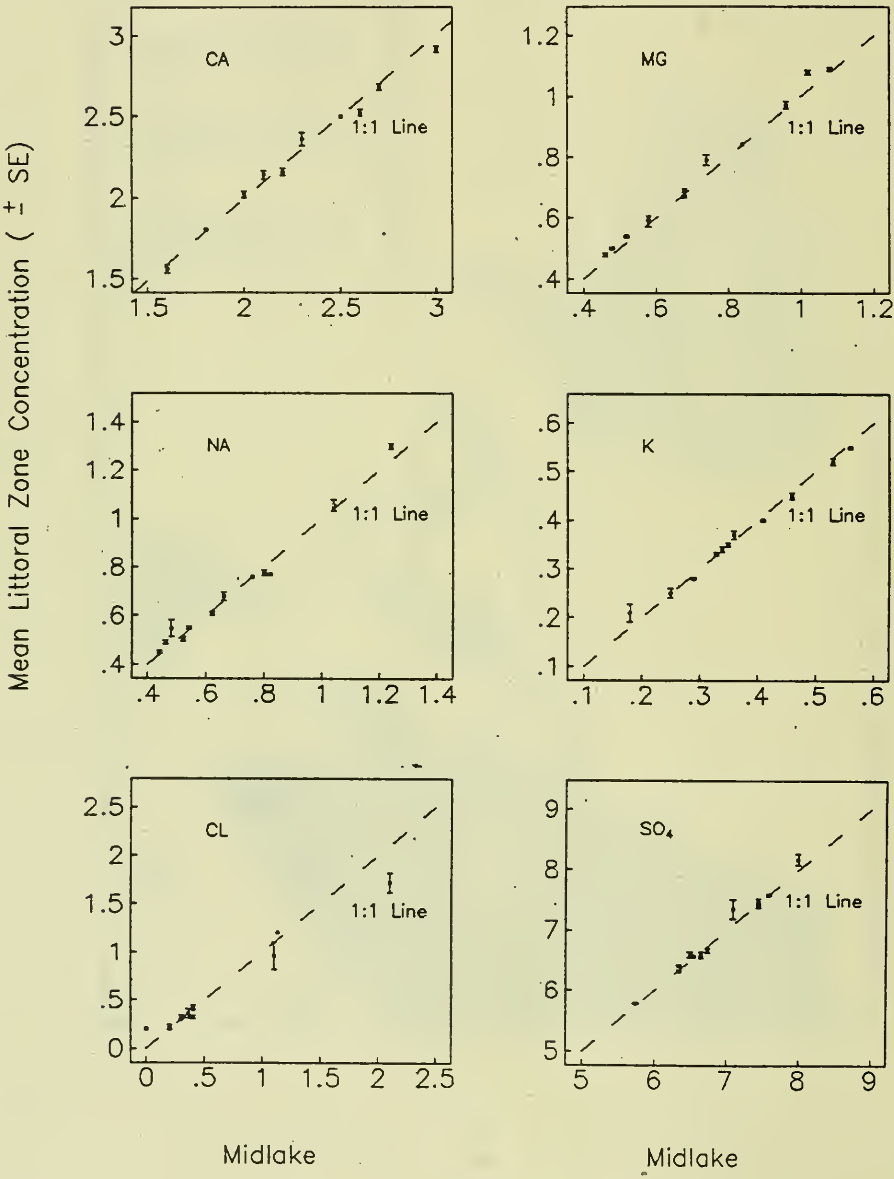


Figure 3 Littoral zone - mid-lake chemistry comparison for alkalinity, aluminum, conductivity, dissolved inorganic carbon and dissolved organic carbon.

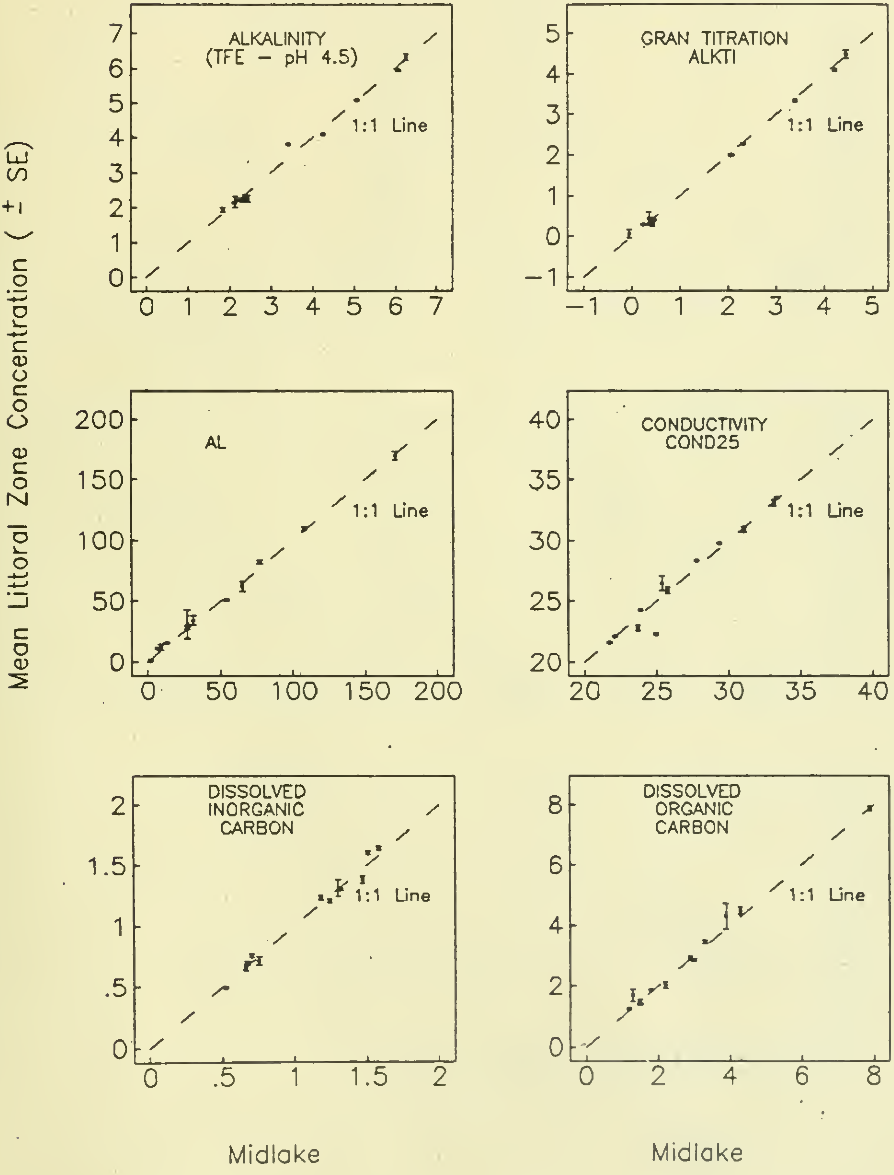


Figure 4 Littoral zone - mid-lake chemistry comparison for nitrate, ammonium, total Kjeldahl nitrogen, total phosphorus and pH.

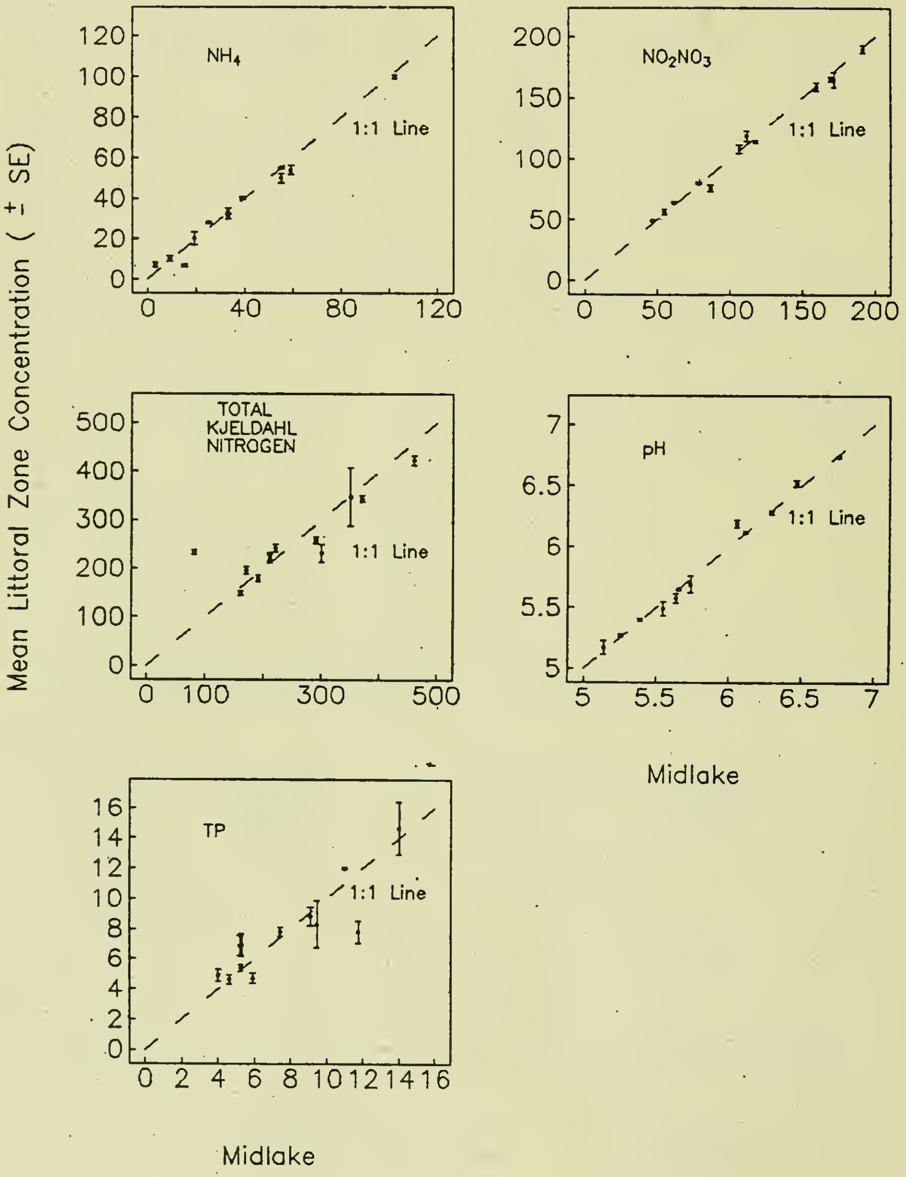


Fig. 5 Z-score plot of the species richness and abundance data from the spring survey of the 12 lakes.

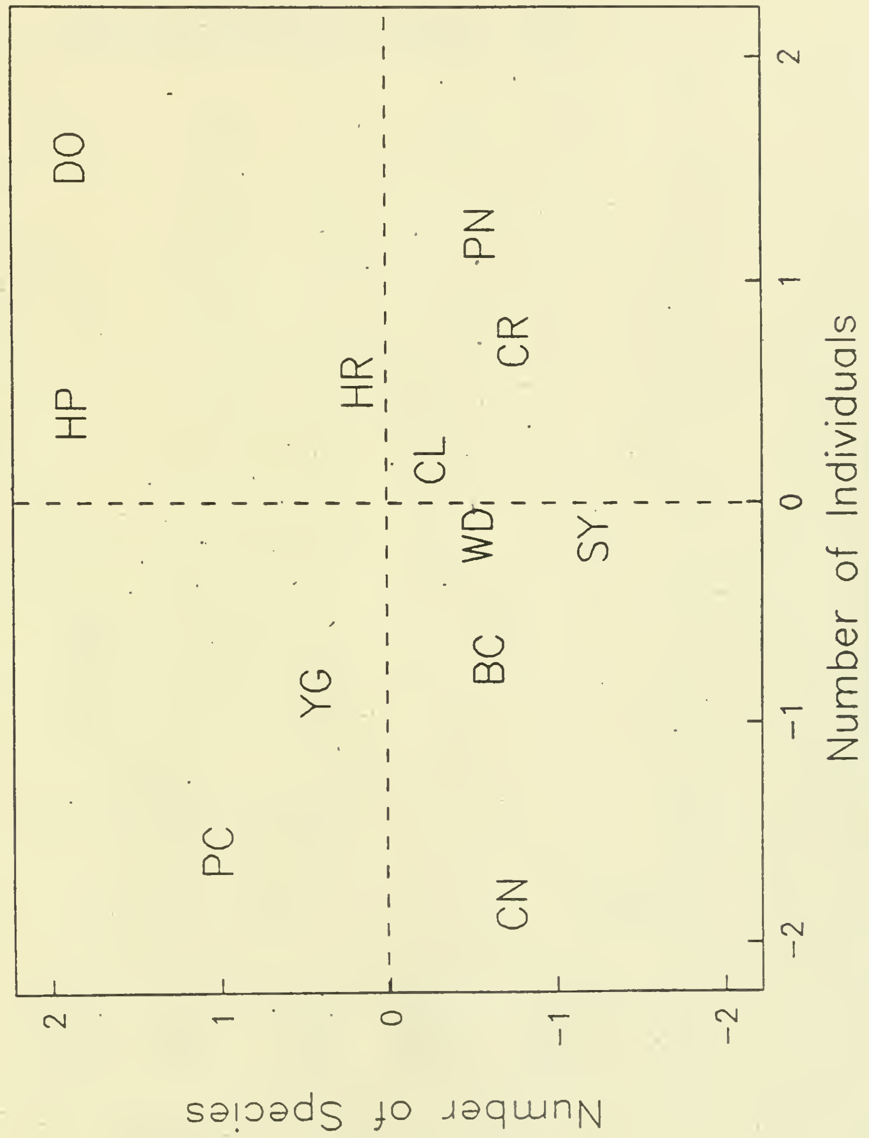
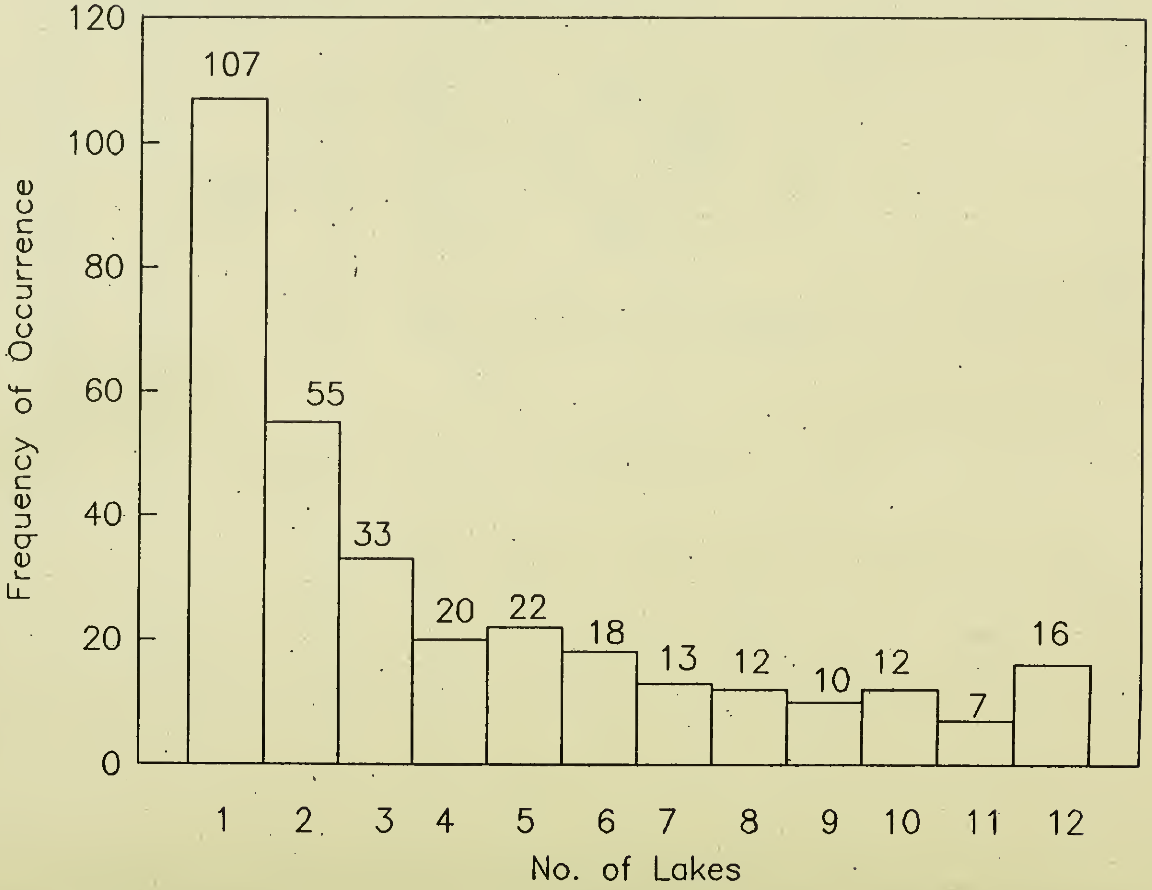


Figure 6 A histogram of the distribution of taxa in the 12 survey lakes.



APPENDIX 5

BENTHIC SPECIES LISTS FOR EACH LAKE

BLUE CHALK LAKE MAY 9 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
NEMATODA	2	2		3		7	1.4	1.3
Anatonchus sp.				2		2	0.4	0.9
Mermithidae	2	2		1		5	1.0	1.0
OLIGOCHAETA	5	8	6	10	4	33	6.6	2.4
Enchytraeidae	1	1	6	2		10	2.0	2.3
Limnodrilus hoffmeisteri	1					1	0.2	0.4
Limnodrilus udekemianus	1					1	0.2	0.4
Lumbriculus variegatus	1	1		6	3	11	2.2	2.4
Lumbriculidae		2				2	0.4	0.9
Tubificidae +hairs	1	3		2	1	7	1.4	1.1
Tubificidae -hairs		1				1	0.2	0.4
HIRUDINEA			1			1	0.2	0.4
Helobdella stagnalis			1			1	0.2	0.4
AMPHIPODA	120	142	128	91	115	596	119.2	18.8
Crangonyx laurentianus			1	1		2	0.4	0.5
Hyalella azteca	120	142	127	90	115	594	118.8	19.0
HYDRACARINA		1	1		1	3	0.6	0.5
Limnesia undulata		1	1		1	3	0.6	0.5
COLLEMBOLA		1				1	0.2	0.4
Isotomurus (Hydroistoma) schaefferi		1				1	0.2	0.4
EPHEMEROPTERA	7	58	12	28	45	150	30.0	21.6
Caenis punctata	3	32	3		2	40	8.0	13.5
Ephemera simulans		1		3		4	0.8	1.3
Eurylophella temporalis	3	18	8	20	39	88	17.6	13.9
Hexagenia limbata		2	1	3	2	8	1.6	1.1
Leptophlebia intermedia		2		1	2	5	1.0	1.0
Siphloplecton basale	1					1	0.2	0.4
Stenacron interpunctatum		3		1		4	0.8	1.3
ODONATA	6	12	7	2	6	33	6.6	3.6
Basiaeschna janata		1				1	0.2	0.4
Didymops transversa		1		1		2	0.4	0.5
Enallagma exsulans		4	4		1	9	1.8	2.0
Enallagma hageni					5	5	1.0	2.2
Hagenius brevistylus	1					1	0.2	0.4
Gomphus exilis	5	6	3	1		15	3.0	2.5
HEMIPTERA		1				1	0.2	0.4
Corixidae juv.		1				1	0.2	0.4
MEGALOPTERA			2			2	0.4	0.9
Sialis sp.			2			2	0.4	0.9
TRICHOPTERA	5	6	4	2	2	19	3.8	1.8
Agarodes cf. distinctus	1		1			2	0.4	0.5
Molanna ulmerina-uniophila		2				1	0.2	0.4
Mystacides sepulchralis	1		1			2	0.4	0.5
Nectopsyche sp.1	1		1			2	0.4	0.5
Nyctiophylax affinis		1		1		2	0.4	0.5
Oecetis sp.1	1					1	0.2	0.4
Oecetis sp.2		1				1	0.2	0.4
Oecetis sp.4 (?ovara)			1	1		2	0.4	0.5
Polycentropus sp.2	1	2				3	0.6	0.9
Triaenodes sp.1					1	1	0.2	0.4
Triaenodes sp.2					1	1	0.2	0.4
LEPIDOPTERA					1	1	0.2	0.4
Geometridae (Terrestrial)					1	1	0.2	0.4
COLEOPTERA	4	9	4	8	12	37	7.4	3.4
Dubiraphia minima-vitatta	1	4		2		7	1.4	1.7
Hydroporus (Neoporus) undulatus	1	1			4	6	1.2	1.6
Stenelmis crenata	2	4	4	6	8	24	4.8	2.3
DIPTERA	209	177	102	131	85	704	140.8	51.7
DIPTERA:Ceratopogonidae	23	2	9	32	35	101	20.2	14.3
Bezzia sp.1				1		1	0.2	0.4
Bezzia sp.6				1		1	0.2	0.4
Probezzia sp.1	19	2	8	29	33	91	18.2	13.3
Probezzia sp.3	4		1	1		6	1.2	1.6
Stilobezzia sp.					2	2	0.4	0.9

CLEAR LAKE APRIL 28 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
TURBELLARIA		1				1	0.2	0.4
Dugesia tigrina		1				1	0.2	0.4
NEMATODA	1	1	1	1	2	6	1.2	0.4
Anatonchus sp.		1	1	1	2	5	1.0	0.7
Divispiculimermis sp.	1					1	0.2	0.4
OLIGOCHAETA	16	8	10	32	11	77	15.4	9.7
Enchytraeidae	3	2		1		6	1.2	1.3
Lumbriculus prob. variegatus	12	6	10	28	6	62	12.4	9.1
Tubificidae +hairs				3		3	0.6	1.3
Tubificidae -hairs	1				5	6	1.2	2.2
HIRUDINEA			3	1		4	0.8	1.3
Erpobdella punctata				1		1	0.2	0.4
Helobdella stagnalis			3			3	0.6	1.3
AMPHIPODA	79	38	35	19	15	186	37.2	25.4
Crangonyx laurentianus	41	19	28	15	11	114	22.8	12.0
Hyalella azteca	38	19	7	4	4	72	14.4	14.6
DECAPODA			1			1	0.2	0.4
Orconectes propinquus			1			1	0.2	0.4
EPHEMEROPTERA	184	63	110	66	107	530	106.0	48.9
Caenis diminuta	120	2	22	1	40	185	37.0	49.1
Eurylophella temporalis	16	31	65	13	17	142	28.4	21.6
Hexagenia rigida					1	1	0.2	0.4
Leptophlebia intermedia	48	30	23	51	48	200	40.0	12.6
Siphloplectron basale				1		1	0.2	0.4
Stenonema (s.str.) femoratum					1	1	0.2	0.4
ODONATA	3		3		5	11	2.2	2.2
Aeschna eremita	1					1	0.2	0.4
Aeschna tuberculifera			2			2	0.4	0.9
Enallagma hageni					3	3	0.6	1.3
Gomphus lividus					1	1	0.2	0.4
Ischnura verticalis	2		1			3	0.6	0.9
Ladona julia					1	1	0.2	0.4
MEGALOPTERA					4	4	0.8	1.8
Sialis sp.					4	4	0.8	1.8
TRICHOPTERA	5	6	8	2	7	28	5.6	2.3
Agarodes cf. distinctus				1		1	0.2	0.4
Mystacides sepulchralis		1	1			2	0.4	0.5
Nectopsyche sp.1	1					1	0.2	0.4
Oecetis sp.1			2		1	3	0.6	0.9
Oecetis sp.2		3	3		3	9	1.8	1.6
Oxyethira sp.1			1	1	2	4	0.8	0.8
Platycentropus sp.					1	1	0.2	0.4
Polycentropus sp.1		2				2	0.4	0.9
Polycentropus sp.2			1			1	0.2	0.4
Triaenodes sp.1 nr. sp.'b' Ross	4					4	0.8	1.8
LEPIDOPTERA		1	5			6	1.2	2.2
Geometridae (Terrestrial)			5			5	1.0	2.2
Petrophila sp.		1	0			1	0.2	0.4
COLEOPTERA	3	70	13	1	1	88	17.6	29.7
Dineutus nigrior	1					1	0.2	0.4
Gyrinus affinis	1					1	0.2	0.4
Gyrinus lugens	1					1	0.2	0.4
Gyrinus pectoralis			2			2	0.4	0.9
Stenelmis crenata		70	11	1	1	83	16.6	30.2
DIPTERA	194	537	127	46	128	1032	206.4	192.1
DIPTERA:Ceratopogonidae	5	6	2	5	8	26	5.2	2.2
Bezzia sp.1	3	3	1	1	3	11	2.2	1.1
Bezzia sp.2/2A		1	1		1	3	0.6	0.5
Bezzia sp.3	1			1	4	6	1.2	1.6
Bezzia sp.4	1					1	0.2	0.4
Bezzia sp.5				1		1	0.2	0.4
Bezzia sp.7				1		1	0.2	0.4
Culicoides (O.)stellifer				1		1	0.2	0.4
Dasyhelea sp.2(dark head)		1				1	0.2	0.4
Probezzia sp.1		1				1	0.2	0.4

CRADLE LAKE APRIL 29 1988

	SITE					TOTAL	MEAN	STD
TAXONOMIC NAME	1	2	3	4	5			
OLIGOCHAETA			8	2	6	16	3.2	3.6
Enchytraeidae					1	1	0.2	0.4
Lumbriculus variegatus			7	2	5	14	2.8	3.1
Nais pseudobtusa			1			1	0.2	0.4
HIRUDINEA					2	2	0.4	0.9
Gloiobdella elongata					1	1	0.2	0.4
Nephelopsis obscura					1	1	0.2	0.4
AMPHIPODA	46	20	6	34	270	376	75.2	109.9
Crangonyx laurentianus	13	19		13	14	59	11.8	7.0
Hyalella azteca	33	1	6	21	256	317	63.4	108.4
HYDRACARINA					1	1	0.2	0.4
Unionicola crassipes laurentiana					1	1	0.2	0.4
COLLEMBOLA	1			2		3	0.6	0.9
Isotomurus (Hydroisotoma) schaefferi	1			2		3	0.6	0.9
EPHEMEROPTERA	28	9	36	48	358	479	95.8	147.3
Caenis diminuta			13	7	181	201	40.2	78.9
Eurylophella temporalis	11	6	14	24	57	112	22.2	20.0
Leptophlebia intermedia	17	3	6	17	118	161	32.2	48.4
Siphloplecton basale			3		1	4	0.8	1.3
Stenacron interpunctatum					1	1	0.2	0.4
ODONATA	1	9		2	38	50	10	16.0
Cordulia shurtleffi		1				1	0.2	0.4
Enallagma hageni					35	35	7	15.7
Gomphus exilis		1				1	0.2	0.4
Leucorrhinia hudsonica					3	3	0.6	1.3
Libellula julia	1	7		2		10	2	2.9
HEMIPTERA	4	2	6	5	4	21	4.2	1.5
Hesperocorixa michiganensis	3	2	1	4		10	2	1.6
Notonecta undulata					2	2	0.4	0.9
Sigara (arcto.) penniensis	1		1	1		3	0.6	0.9
Sigara (Phaeo.) mackinacensis					2	2	0.4	0.9
Sigara (Vermi.) deflecta			4			4	0.8	1.3
NEUROPTERA			1			1	0.2	0.4
Climacia areolaris			1			1	0.2	0.4
TRICHOPTERA	14	8		3	28	53	10.6	11.1
Hydroptila sp.1					1	1	0.2	0.4
Lype diversa				1	2	3	0.6	0.9
Molanna ulmerina-uniophila					1	1	0.2	0.4
Mystacides sepulchralis	1				1	2	0.4	0.5
Nyctiophylax affinis					1	1	0.2	0.4
Oecetis sp.1	6	5		1	9	21	4.2	3.7
Oecetis sp.2	7	2		1	8	18	3.6	3.6
Orthotrichia sp.					1	1	0.2	0.4
Oxyethira sp.1		1				1	0.2	0.4
Oxyethira sp.2					1	1	0.2	0.4
Polycentropus sp.2					1	1	0.2	0.4
Triaenodes sp.1					2	2	0.4	0.9
COLEOPTERA			1	4	8	13	2.6	3.4
Gyrinus affinis				1		1	0.2	0.4
Hydroporus (Neoporus) undulatus			1	3	6	10	2	2.5
Scirtes sp.2					2	2	0.4	0.9

CRADLE LAKE APRIL 29 1988

	SITE					TOTAL	MEAN	STD
TAXONOMIC NAME	1	2	3	4	5			
DIPTERA	491	377	26	151	317	1362	272.4	184.5
DIPTERA:Ceratopogonidae	4	8	8	13	20	53	10.6	6.1
Bezzia sp.1		3	1	8	4	16	3.2	3.1
Bezzia sp.2/2A		2			1	3	0.6	0.9
Bezzia sp.3		3	2		14	19	3.8	5.8
Bezzia sp.4			1	2	1	4	0.8	0.8
Bezzia sp.5				3		3	0.6	1.3
Palpomyia sp.2	1					1	0.2	0.4
Probezzia sp.2	3		4			7	1.4	1.9
DIPTERA:Chironomidae	486	369	18	136	296	1305	261	185.9
Subfam.-Tanypodinae	191	162	5	35	100	493	98.6	79.6
Ablabesmyia (s.str.) spp.	43	44	2	2	37	128	25.6	21.7
Clinotanypus pinguis	2	1		3	6	12	2.4	2.3
Conchapelopia sp.			1	1	1	3	0.6	0.5
Procladius (s.lat.) spp.	146	117	2	29	55	349	69.8	60.2
Zavrelimyia sp.					1	1	0.2	0.4
Subfam.-Orthocladiinae	8	2	1	3	12	26	5.2	4.7
Corynoneura lacustris	1				1	2	0.4	0.5
Corynoneura nr. scutellata					1	1	0.2	0.4
Heterotanytarsus nudalus	1				1	2	0.4	0.5
Heterotrissocladius changi	2					2	0.4	0.9
Heterotrissocladius hirtapex				2		2	0.4	0.9
Parametriocnemus lundbecki		1				1	0.2	0.4
Psectrocladius (Mono.) cf. calcaratus	1					1	0.2	0.4
Psectrocladius (s.str.) litofilus	3	1	1	1	7	13	2.6	2.6
Psectrocladius (s.str.) simulans					2	2	0.4	0.9
Subfam.-Chironominae	287	205	12	98	184	786	157.2	105.4
Tribe-Chironomini	210	150	10	72	138	580	116	76.9
Chironomus (s. str.) spp.	5	9		3	2	19	3.8	3.4
Cladopelma sp.	7	21		2	2	32	6.4	8.6
Cryptochironomus conus		1		1	3	5	1	1.2
Dicrotendipes modestus	2			1		3	0.6	0.9
Dicrotendipes tritomus	8	5	1	16	22	52	10.4	8.5
Endochironomus nigricans					1	1	0.2	0.4
Glyptotendipes sp. 1 gr."A"		2			2	4	0.8	1.1
Lauterborniella agrayloides			3		3	6	1.2	1.6
Microtendipes pedellus	13	16		4	7	40	8	6.5
Nilothauma babiyi	1				1	2	0.4	0.5
Omisus caledonicus	2					2	0.4	0.9
Pagastiella ostansa	5	1			1	7	1.4	2.1
Paratendipes albimanus			1		1	2	0.4	0.5
Phaenopsectra sp.	1	4				5	1	1.7
Polypedilum (Tripodura) simulans	12	27	1	1	11	52	10.4	10.7
Pseudochironomus spp.					2	2	0.4	0.9
Stenochironomus hilaris					2	2	0.4	0.9
Stictochironomus sp.1/3					4	4	0.8	1.8
Tribelos jucundum	149	64		36	66	315	63	55.0
Zavreliella marmorata	5		4	8	8	25	5	3.3
Tribe-Tanytarsini	77	55	2	26	46	206	41.2	28.6
Cladotanytarsus sp.1	2	5			2	9	1.8	2.0
Paratanytarsus sp.	3	2			2	7	1.4	1.3
Tanytarsus/Micropsectra spp.	72	48	2	26	42	190	38	26.0
DIPTERA:Misc.	1			2	1	4	0.8	0.8
Chaoboridae:Chaoborus (Sayomyia) punctipennis	1			2	1	4	0.8	0.8
GASTROPODA					1	1	0.2	0.4
Menetus (Micro) dilatatus					1	1	0.2	0.4
PELECYPODA	6	8	10	9	9	42	8.4	1.5
Pisidium casertanum	6	8	10	9	7	40	8	1.6
Pisidium nitidum					2	2	0.4	0.9

CROSSON LAKE MAY 21 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
OLIGOCHAETA	2	13	11	5	10	41	8.2	4.5
Enchytraeidae			2			2	0.4	0.9
Lumbriculus variegatus		12	9	4	10	35	7.0	4.9
Tubificidae +hairs	2	1		1		4	0.8	0.8
HIRUDINEA		1	3	2	6	12	2.4	2.3
Erpobdella punctata		1			2	3	0.6	0.9
Helobdella stagnalis			3	2	4	9	1.8	1.8
AMPHIPODA	2	53	15	7	20	97	19.4	20.0
Crangonyx laurentianus	2	53	2	6	12	75	15.0	21.6
Hyalella azteca			13	1	8	22	4.4	5.9
HYDRACARINA	1		7		1	9	1.8	2.9
Limnesia undulata			1			1	0.2	0.4
Unionicola crassipes laurentiana	1		6		1	8	1.6	2.5
EPHEMEROPTERA	4	79	42	63	222	410	82.0	83.1
Caenis spp.		1	7	1	4	13	2.6	2.9
Eurylophella temporalis	1	37	24	53	117	232	46.4	43.8
Hexagenia limbata					1	1	0.2	0.4
Leptophlebia intermedia		16	9	6	98	129	25.8	40.8
Siphloplecton basale			1			1	0.2	0.4
Stenacron interpunctatum	3	22		3	2	30	6.0	9.0
Stenonema (s.str.) femoratum		3	1			4	0.8	1.3
ODONATA	2	2	6	3	20	33	6.6	7.7
Aeshna umbrosa					1	1	0.2	0.4
Basiaeschna janata			1	1		2	0.4	0.5
Boyeria grafiana	1			1		2	0.4	0.5
Cordulia shurtleffi					1	1	0.2	0.4
Epitheca cynosura			1		1	2	0.4	0.5
Gomphus exilis	1		3			4	0.8	1.3
Ischnura verticalis		2	1	1	15	19	3.8	6.3
Somatochlora williamsoni					2	2	0.4	0.9
HEMIPTERA			1	3	1	5	1.0	1.2
Cenocorixa n.sp.				1		1	0.2	0.4
Hesperocorixa kennicotti				2	1	3	0.6	0.9
Sigara (Arcto.) decoratella			1			1	0.2	0.4
MEGALOPTERA		3			1	4	0.8	1.3
Chauliodes sp.					1	1	0.2	0.4
Sialis sp.		3				3	0.6	1.3
TRICHOPTERA	1	3	3	5	6	18	3.6	1.9
Nectopsyche sp.1					2	2	0.4	0.9
Nyctiophylax affinis				1		1	0.2	0.4
Oecetis cinerascens		2				2	0.4	0.9
Oecetis sp.2			2			2	0.4	0.9
Oxyethira sp.2				1	1	2	0.4	0.5
Platycentropus sp.			1			1	0.2	0.4
Polycentropus sp.2	1	1		2	1	5	1.0	0.7
Pycnopsyche sp.1					1	1	0.2	0.4
Triaenodes sp.2				1	1	2	0.4	0.5
LEPIDOPTERA		1	3			4	0.8	1.3
Geometridae (Terrestrial)		1	3			4	0.8	1.3
COLEOPTERA		6	1		10	17	3.4	4.4
Dubiraphia minima-vitatta			1		9	10	2.0	3.9
Ectopria nervosa		1				1	0.2	0.4
Scirtes sp.1		1			1	2	0.4	0.5
Stenelmis crenata		4				4	0.8	1.8

CROSSON LAKE MAY 21 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
DIPTERA	23	31	66	33	74	227	45.4	22.9
DIPTERA:Ceratopogonidae	1	1	17	1	2	22	4.4	7.1
Bezzia sp.2/2A			8			8	1.6	3.6
Bezzia sp.3		1	6		1	8	1.6	2.5
Culicoides sp.2			1			1	0.2	0.4
Palpomyia sp.1 tibialis gr.			1			1	0.2	0.4
Probezzia sp.1	1		1	1	1	4	0.8	0.4
DIPTERA:Chironomidae	22	30	49	32	70	203	40.6	19.2
Subfam.-Tanypodinae	3	6	11	1	16	37	7.4	6.1
Ablabesmyia (s.str.)spp.	2		1	1	8	12	2.4	3.2
Clinotanypus pinguis			2			2	0.4	0.9
Conchapelopia sp.		5				5	1.0	2.2
Larsia canadensis	1	1				2	0.4	0.5
Natarsia baltimoreus					1	1	0.2	0.4
Procladius (s.lat) spp.			8		7	15	3.0	4.1
Subf.-Orthocladiinae	14	5	11	2	12	44	8.8	5.1
Corynoneura nr. scutellata		1				1	0.2	0.4
Corynoneura sp.1				1		1	0.2	0.4
Cricotopus (s.str.) sp. cylindraceus gr			1			1	0.2	0.4
Heterotrissocladius hirtapex			6		2	8	1.6	2.6
Limnophyes sp.					2	2	0.4	0.9
Nanocladius (s.str.) nr. minimus					1	1	0.2	0.4
Parakiefferiella n.sp.1 (ELA)	1					1	0.2	0.4
Parametriocnemus lundbecki					2	2	0.4	0.9
Psectrocladius (Mono.) cf. calcaratus	1		1			2	0.4	0.5
Psectrocladius (s.str.) litofilus	1	1			2	4	0.8	0.8
Psectrocladius (s.str.) simulans	9	3	3		3	18	3.6	3.3
Synorthocladius semivirens	2					2	0.4	0.9
Xylotopus par				1		1	0.2	0.4
Subfam.-Chironominae	5	19	27	29	42	122	24.4	13.6
Tribe-Chironomini	2	17	27	29	33	108	21.6	12.4
Chironomus (s.str.) spp.		2	1		1	4	0.8	0.8
Cryptochironomus conus	1					1	0.2	0.4
Dicrotendipes leucoscelis			3			3	0.6	1.3
Endochironomus nigricans	1	8	5	9	10	33	6.6	3.6
Glyptotendipes sp. gr."B"			1			1	0.2	0.4
Microtendipes pedellus		1				1	0.2	0.4
Paratendipes albimanus		1				1	0.2	0.4
Phaenopsectra flavipes				1	2	3	0.6	0.9
Polypedilum (Pentapedilum) tritum			2			2	0.4	0.9
Polypedilum (Tripodura) simulans			3	3	2	8	1.6	1.5
Pseudochironomus spp.			2			2	0.4	0.9
Sergentia coracina			1		8	9	1.8	3.5
Stenochironomus hilaris				2	1	3	0.6	0.9
Stictochironomus sp(p.)			7	4	2	13	2.6	3.0
Tribelus jucundum		5	2	10	5	22	4.4	3.8
Zavreliella marmorata					2	2	0.4	0.9
Tribe-Tanytarsini	3	2			9	14	2.8	3.7
Cladotanytarsus sp.	1					1	0.2	0.4
Parapsectra sp.					2	2	0.4	0.9
Paratanytarsus sp.	1				4	5	1.0	1.7
Tanytarsus/Micropsectra spp.	1	2			3	6	1.2	1.3
DIPTERA:Tipulidae					2	2	0.4	0.9
Hexatoma sp.					1	1	0.2	0.4
Tipula sp.1					1	1	0.2	0.4
PELECYPODA		1	1	1	11	14	2.8	4.6
Pisidium casertanum		1	1	1	11	14	2.8	4.6

DELANO LAKE MAY 4 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
Subfam. Orthocladiinae cont'd	1	2	3	4	5			
Psectrocladius (s.str.) simulans	4	1	2	7	2	16	3.2	2.4
Pseudorthocladius sp.				1		1	0.2	0.4
Synorthocladius semivirens	2				1	3	0.6	0.9
Zalutschia obsepta	2					2	0.4	0.9
Subfam.–Chironominae	160	113	101	282	87	743	148.6	79.5
Tribe–Chironomini	90	86	63	221	48	508	101.6	68.9
Cladopelma sp.	2	1		1		4	0.8	0.8
Chironomus (s.str.) spp.	17	23	8	11	2	61	12.2	8.1
Cryptochironomus comus	4	2	3	5		14	2.8	1.9
Dicrotendipes leucoscelis	1					1	0.2	0.4
Dicrotendipes modestus	2		2	21	3	28	5.6	8.7
Dicrotendipes tritomus	10	1	2	10	6	29	5.8	4.3
Endochironomus nigricans	1	1				2	0.4	0.5
Glyptotendipes sp.1 gr."A"			1	5	1	7	1.4	2.1
Glyptotendipes sp. gr."B"				1		1	0.2	0.4
Lauterborniella agrayloides	15	12	1	7		35	7	6.6
Microtendipes pedellus		2	1	1	1	5	1	0.7
Nilothauma sp.	2			1		3	0.6	0.9
Pagastiella ostansa	6	4	21	95	17	143	28.6	37.8
Parachironomus abortivus	1					1	0.2	0.4
Paratendipes albimanus	2	1	1	2		6	1.2	0.8
Phaenopsectra sp.	2	3		11		16	3.2	4.5
Polypedilum (Pentapedilum) tritum	4	1	2	10	12	29	5.8	4.9
Polypedilum (Tripodura) simulans	3	1	2	12		18	3.6	4.8
Pseudochironomus spp.	3	1		5	1	10	2	2.0
Stenochironomus hilaris		1			1	2	0.4	0.5
Phaenopsectra flavipes				1		1	0.2	0.4
Tribelos jucundum	1	1	4	3	4	13	2.6	1.5
Zavreliella marmorata	14	31	15	19		79	15.8	11.1
Tribe–Tanytarsini	70	27	38	61	39	235	47	17.8
Cladotanytarsus spp.	12	1	1	10	7	31	6.2	5.1
Paratanytarsus sp.	5	3	5	3	2	18	3.6	1.3
Stempellina sp.	5		7	2	1	15	3	2.9
Stempellinella sp.	12	2		2	1	17	3.4	4.9
Tanytarsus/Micropsectra spp.	36	21	25	44	28	154	30.8	9.2
DIPTERA:Tabanidae		1				1	0.2	0.4
Chrysops ater		1				1	0.2	0.4
DIPTERA:Misc.	1	1		1		3	0.6	0.5
Chaoboridae:Chaoborus (Sayomyia) punctipennis				1		1	0.2	0.4
Empididae:Hemerodromia sp.	1	1				2	0.4	0.5
GASTROPODA	9	4	1	21	3	38	7.6	8.0
Amnicola limosa	4	1		16	3	24	4.8	6.5
Ferrissia fragilis	1					1	0.2	0.4
Menetus (Micro.) dilatatus?	4	3	1	5		13	2.6	2.1
PELECYPODA	4			5	4	13	2.6	2.4
Pisidium casertanum	2			4	2	8	1.6	1.7
Pisidium lilljeborgi					2	2	0.4	0.9
Pisidium nitidum	2					2	0.4	0.9
Pisidium variable				1		1	0.2	0.4

DELANO LAKE MAY 4 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
TURBELLARIA	3				1	4	0.8	1.3
Dugesia tigrina	3				1	4	0.8	1.3
NEMATODA	2		1	1		4	0.8	0.8
Anatonchus sp.	1			1		2	0.4	0.5
Mermithidae	1		1			2	0.4	0.5
OLIGOCHAETA	11		1	9	5	26	5.2	4.8
Enchytraeidae				3		3	0.6	1.3
Limnodrilus hoffmeisteri				2		2	0.4	0.9
Lumbriculus variegatus	6			1	1	8	1.6	2.5
Nais pseudobtusa	1					1	0.2	0.4
Tasserkidrilus harmani			1			1	0.2	0.4
Tubificidae +hairs	3			3	2	8	1.6	1.5
Tubificidae -hairs					2	2	0.4	0.9
Vejdovskyella comata	1					1	0.2	0.4
HIRUDINEA	1	4				5	1	1.7
Erpobdella punctata		2				2	0.4	0.9
Helobdella stagnalis	1	2				3	0.6	0.9
AMPHIPODA	208	38	35	11	138	430	86	83.8
Crangonyx laurentianus	2	4		3		9	1.8	1.8
Hyalella azteca	206	34	35	8	138	421	84.2	84.4
HYDRACARINA	13	10	6	18	2	49	9.8	6.1
Arrenurus (Mega.) cardiacus		1				1	0.2	0.4
Atractides n.sp.		1				1	0.2	0.4
Huitfeldtia rectipes	2					2	0.4	0.9
Lebertia distincta	1					1	0.2	0.4
Limnesia maculata		2				2	0.4	0.9
Limnesia undulata				1		1	0.2	0.4
Pseudohydryphantes orbicularis				2		2	0.4	0.9
Unionicola crassipes laurentiana	10	6	6	15	2	39	7.8	4.9
COLLEMBOLA	1					1	0.2	0.4
Hypogastrura sp.	1					1	0.2	0.4
EPHEMEROPTERA	104	46	77	255	98	580	116	80.9
Caenis diminuta	50	18	40	222	36	366	73.2	84.0
Eurylophella temporalis	18		12	7	15	52	10.4	7.1
Leptophlebia intermedia	29	27	23	26	43	148	29.6	7.8
Stenacron interpunctatum	6		2		4	12	2.4	2.0
Stenonema (s.str.) femoratum	1	1				2	0.4	0.5
ODONATA	37	6	13	17	32	105	21	13.1
Aeshna eremita	1					1	0.2	0.4
Basiaeschna janata					2	2	0.4	0.9
Chromagrion conditum				1		1	0.2	0.4
Cordulia shurtleffi			1	3		4	0.8	1.3
Enallagma exsulans	2				1	3	0.6	0.9
Enallagma hageni	7	2	1	6	10	26	5.2	3.7
Epitheca cynosura				1		1	0.2	0.4
Hagenius brevistylus	8					8	1.6	3.6
Gomphus exilis	10	2	5	2	12	31	6.2	4.6
Ischnura verticalis	6	2	5	3	7	23	4.6	2.1
Libellula julia	1		1	1		3	0.6	0.5
Somatochlora williamsoni	2					2	0.4	0.9
HEMIPTERA				5		5	1	2.2
Cenocorixa n.sp.				2		2	0.4	0.9
Hesperocorixa michiganensis				2		2	0.4	0.9
Sigara (Phaeo.) compressoidea				1		1	0.2	0.4

DELANO LAKE MAY 4 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
TRICHOPTERA	8	2	3	37	14	64	12.8	14.3
Agarodes cf. distinctus				1		1	0.2	0.4
Ceraclea alces	1					1	0.2	0.4
Hydroptila sp.1				3		3	0.6	1.3
Lepidostoma sp.					1	1	0.2	0.4
Mystacides sepulchralis	2		1		1	4	0.8	0.8
Nectopsyche sp.1				1	1	2	0.4	0.5
Nectopsyche sp.2	3				1	4	0.8	1.3
Oecetis sp.1	1		1	2	2	6	1.2	0.8
Oecetis sp.2				2		2	0.4	0.9
Oecetis sp.4 (?ovara)		1				1	0.2	0.4
Orthotrichia sp.				2		2	0.4	0.9
Oxyethira sp.2	1			20		21	4.2	8.8
Oxyethira sp.3				2	7	9	1.8	3.0
Platycentropus sp.			1			1	0.2	0.4
Polycentropus sp.1		1		3		4	0.8	1.3
Polycentropus sp.2					1	1	0.2	0.4
Pycnopsyche sp.1				1		1	0.2	0.4
COLEOPTERA	49	17	31	33	9	139	27.8	15.5
Dubiraphia minima-vitatta	35	14	30	16	8	103	20.6	11.4
Gyrinus frosti		2				2	0.4	0.9
Gyrinus latilimbus	1					1	0.2	0.4
Haliplus pantherinus				1		1	0.2	0.4
Melyridae	1					1	0.2	0.4
Scirtes sp.1					1	1	0.2	0.4
Stenelmis crenata	12	1	1	16		30	6	7.4
DIPTERA	384	161	189	490	252	1476	295.2	138.7
DIPTERA:Ceratopogonidae	3	1	9	13	2	28	5.6	5.2
Bezzia sp.1		1	5	5		11	2.2	2.6
Bezzia sp.2/2A			1	3		4	0.8	1.3
Bezzia sp.3			2	3		5	1	1.4
Bezzia sp.4				1		1	0.2	0.4
Bezzia sp.5	1					1	0.2	0.4
Culicoides (O.) stellifer					1	1	0.2	0.4
Monohelea sp.				1		1	0.2	0.4
Probezzia sp.1	2		1		1	4	0.8	0.8
DIPTERA:Chironomidae	380	158	180	476	250	1444	288.8	135.8
Subfam.-Tanypodinae	160	33	50	136	135	514	102.8	57.2
Ablabesmyia (s.str.) spp.	26	11	25	33		95	19	13.3
Clinotanypus pinguis				3		3	0.6	1.3
Conchapelopia sp.	21	9	6	8	3	47	9.4	6.9
Labrundinia neopilosella	1		3	4		8	1.6	1.8
Labrundinia pilosella	1	3				4	0.8	1.3
Larsia canadensis	30	1	5	6	42	84	16.8	18.1
Procladius (s.lat.) spp.	80	9	11	82	90	272	54.4	40.7
Zavrelimyia sp.	1					1	0.2	0.4
Subfam.-Orthocladiinae	60	12	29	58	28	187	37.4	20.9
Corynoneura nr. scutellata	2					2	0.4	0.9
Corynoneura sp.1		2	2	1		5	1	1.0
Cricotopus (s.str.) nr. festivellus				2	2	4	0.8	1.1
Cricotopus (Iso.) intersectus			1			1	0.2	0.4
Heterotrissocladius hirtapex	4				2	6	1.2	1.8
Parakiefferiella n.sp.1 (ELA)	25	2	7	2	4	40	8	9.7
Parametriocnemus lundbecki			1	2		3	0.6	0.9
Paraphaenocladius cf. nathecus			1			1	0.2	0.4
Psectrocladius (Mono.) cf. calcaratus		1		13		14	2.8	5.7
Psectrocladius (s.str.) litofilus	21	6	15	30	17	89	17.8	8.8

SKIDWAY LAKE APRIL 20 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
OLIGOCHAETA	3	9	1	4	1	18	3.6	3.3
Lumbriculus variegatus	3	9	1	4	1	18	3.6	3.3
HIRUDINEA		2				2	0.4	0.9
Erpobdella punctata		2				2	0.4	0.9
ISOPODA		21	3		13	37	7.4	9.3
Asellus forbesi		21	3		13	37	7.4	9.3
AMPHIPODA	42	24	14	39	86	205	41.0	27.6
Crangonyx laurentianus	41	24	14	39	86	204	40.8	27.6
Hyalella azteca	1					1	0.2	0.4
HYDRACARINA		1	1		2	4	0.8	0.8
Limnesia undulata		1	1		2	4	0.8	0.8
EPHEMEROPTERA	138	46	83	108	53	428	85.6	38.4
Caenis puntata		7	8	4	1	20	4.0	3.5
Eurylophella temporalis	19	2	2	4	29	56	11.2	12.2
Leptophlebia intermedia	119	37	73	100	23	352	70.4	40.6
ODONATA	10	26	20	26	1	83	16.6	10.9
Aeshna umbrosa	1	2	2			5	1.0	1.0
Cordulia shurtleffi			2	10		12	2.4	4.3
Enallagma hageni	1	2	3	2		8	1.6	1.1
Enallagma vesperum	1	1	1	4		7	1.4	1.5
Epitheca cynosura	3			2		5	1.0	1.4
Gomphus exilis			1			1	0.2	0.4
Ischnura verticalis		8	4	4	1	17	3.4	3.1
Lestes virgilax			1			1	0.2	0.4
Leucorrhinia hudsonica	1	4				5	1.0	1.7
Libellus julia	1	7	5	2		15	3.0	2.9
Libellula incesta	2	2	1	2		7	1.4	0.9
HEMIPTERA			1	3	3	7	1.4	1.5
Cenocorixa n.sp.				1	1	2	0.4	0.5
Hesperocorixa atopodonta					1	1	0.2	0.4
Hesperocorixa michiganensis			1			1	0.2	0.4
Sigara (Phaeo.) compressoidea				2		2	0.4	0.9
Sigara (Vermi.) johnsoni					1	1	0.2	0.4
MEGALOPTERA	1	5	8	8	5	27	5.4	2.9
Chauliodes sp.					1	1	0.2	0.4
Sialis sp.	1	5	8	8	4	26	5.2	2.9
TRICHOPTERA	19	17	23	15	13	87	17.4	3.8
Agrypnia vestita			4	2	1	7	1.4	1.7
Nectopsyche sp.1			1	1		2	0.4	0.5
Oecetis sp.1		2				2	0.4	0.9
Oxyethira sp.1	2	6	6	3		17	3.4	2.6
Oxyethira sp.2			3		1	4	0.8	1.3
Platycentropus sp.	1	4	4	2	9	20	4.0	3.1
Polycentropus sp.1	11	3	4	7	1	26	5.2	3.9
Polycentropus sp.2	4	1	1			6	1.2	1.6
Pycnopsyche sp.1	1	1			1	3	0.6	0.5
COLEOPTERA	4		3			7	1.4	1.9
Dineutus nigrior	1		1			2	0.4	0.5
Hydroporus (Neoporus) undulatus	3		2			5	1.0	1.4

HAMER LAKE APRIL 18 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
NEMATODA				2		2	0.4	0.9
Anatonchus sp.				1		1	0.2	0.4
Mermithidae				1		1	0.2	0.4
OLIGOCHAETA	1	1	15	11	1	29	5.8	6.7
Lumbriculus variegatus		1	15	10	1	27	5.4	6.7
Tubificidae +hairs	1			1		2	0.4	0.5
AMPHIPODA	4	8	39	13	95	159	31.8	37.9
Crangonyx laurentianus	3	6	9	5	1	24	4.8	3.0
Hyalella azteca	1	2	30	8	94	135	27.0	39.2
HYDRACARINA	4	8		2	1	15	3.0	3.2
Arrenurus (s.str.) auricularis					1	1	0.2	0.4
Arrenurus (Mega.) apetiolatus				1		1	0.2	0.4
Pseudohydryphantes orbicularis	2	5				7	1.4	2.2
Unionicola crassipes laurentiana	2	3		1		6	1.2	1.3
EPHEMEROPTERA	129	29	348	115	93	714	142.8	120.9
Caenis diminuta	1	4	5	38		48	9.6	16.0
Eurylophella temporalis	78	15	160	24	10	287	57.4	63.5
Leptophlebia intermedia	50	10	182	53	83	378	75.6	64.9
Stenonema (s.str.) femoratum			1			1	0.2	0.4
ODONATA	30	13	28	24	4	99	19.8	11.0
Basiaeschna janata		1				1	0.2	0.4
Chromagrion conditum			1			1	0.2	0.4
Cordulia shurtleffi		3	3	1		7	1.4	1.5
Enallagma hageni	19	3	5	2	1	30	6.0	7.4
Epitheca cynosura			1			1	0.2	0.4
Gomphus exilis			9			9	1.8	4.0
Ischnura verticalis	4		4			8	1.6	2.2
Lestes vigilax	1					1	0.2	0.4
Leucorrhinia frigida		2	2	15		19	3.8	6.3
Leucorrhinia hudsonica	1	1	1	5		8	1.6	1.9
Libellula julia	5	3	2	1	3	14	2.8	1.5
HEMIPTERA	7		2	3		12	2.4	2.9
Cenocorixa n.sp.	1		1			2	0.4	0.5
Hesperocorixa atopodonta				1		1	0.2	0.4
Hesperocorixa michiganensis			1			1	0.2	0.4
Hesperocorixa vulgaris	1					1	0.2	0.4
Notonecta undulata	4			1		5	1.0	1.7
Sigara (Pileo.) douglasensis	1					1	0.2	0.4
Sigara (Vermi.) johnsoni				1		1	0.2	0.4
MEGALOPTERA	3	2	11		19	35	7.0	7.9
Sialis sp.	3	2	11		19	35	7.0	7.9
TRICHOPTERA	10	11	27	55	27	130	26.0	18.2
Agrypnia vestita		1				1	0.2	0.4
Banksiola smithi				1		1	0.2	0.4
Hydroptila sp.1					3	3	0.6	1.3
Nectopsyche sp.1	1		3	2	4	10	2.0	1.6
Oecetis sp.1	1		2			3	0.6	0.9
Oecetis sp.2	3	2	2	23	9	39	7.8	9.0
Oxyethira sp.1		1	6	9	6	22	4.4	3.8
Oxyethira sp.2		2	3	6	3	14	2.8	2.2
Platycentropus sp.				2		2	0.4	0.9
Polycentropus sp.1	1	1		1		3	0.6	0.5
Polycentropus sp.2	2	4	10	11	2	29	5.8	4.4
Ptilostomis cf. ocellifera	2					2	0.4	0.9
Triaenodes sp.2			1			1	0.2	0.4
COLEOPTERA	2	1			1	4	0.8	0.8
Dineutus nigrior	1					1	0.2	0.4
Donacia sp.					1	1	0.2	0.4
Haliplus pantherinus	1					1	0.2	0.4
Scirtes sp.3		1				1	0.2	0.4

HAMER LAKE APRIL 18 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
DIPTERA	111	147	112	409	236	1015	203.0	125.9
DIPTERA:Ceratopogonidae	21	41	10	33	49	154	30.8	15.6
Atrichopogon polydactylus			1			1	0.2	0.4
Bezzia sp.1	13	28	2	15	19	77	15.4	9.4
Bezzia sp.2/2A	6	12	5	17	18	58	11.6	6.0
Bezzia sp.3			2		6	8	1.6	2.6
Bezzia sp.4	2			1	2	5	1.0	1.0
Culicoides (O.) stellifer					2	2	0.4	0.9
Culicoides sp.1					2	2	0.4	0.9
Palpomyia sp.1 tibialis gr.		1				1	0.2	0.4
DIPTERA:Chironomidae	90	103	97	375	186	851	170.2	120.9
Subfam.–Tanypodinae	35	36	43	117	70	301	60.2	34.8
Ablabesmyia (s.str.) spp.	7	1	1	57	15	81	16.2	23.5
Clinotanypus pinguis	6				3	9	1.8	2.7
Conchapelopia sp.	10	2	13		4	29	5.8	5.5
Larsia canadensis					1	1	0.2	0.4
Natarsia baltimoreus			4			4	0.8	1.8
Procladius (s.lat.) spp.	12	33	25	60	47	177	35.4	18.7
Subfam.–Orthocladiinae	33	22	38	130	58	281	56.2	43.3
Corynoneura sp.1				2		2	0.4	0.9
Cricotopus (s.s.) nr. festivellus				1		1	0.2	0.4
Heterotrissocladius changi			1		1	2	0.4	0.5
Heterotrissocladius hirtapex	1		7		25	33	6.6	10.7
Limnophyes sp.				1		1	0.2	0.4
Parametriocnemus lundbecki			5	1		6	1.2	2.2
Psectrocladius (Mono.) cf. calcaratus	12	15	9	94	25	155	31.0	35.7
Psectrocladius (s.s.) litofilus	20	7	14	31	7	79	15.8	10.1
Pseudorthocladius sp.			1			1	0.2	0.4
Stackelbergina n.sp.			1			1	0.2	0.4
Subfam.–Chironominae	22	45	16	128	58	269	53.8	44.8
Tribe–Chironomini	21	43	16	106	49	235	47.0	35.8
Chironomus (s.str.) spp.		1		1		2	0.4	0.5
Cladopelma sp.				2		2	0.4	0.9
Cryptochironomus conus	2			1	1	4	0.8	0.8
Cryptochironomus spp.		1				1	0.2	0.4
Dicrotendipes leucoscelis			1			1	0.2	0.4
Dicrotendipes tritomus				17		17	3.4	7.6
Endochironomus nigricans	2		2	1		5	1.0	1.0
Glyptotendipes sp. 1 gr."A"	1			1	1	3	0.6	0.5
Glyptotendipes sp. gr."B"			1			1	0.2	0.4
Lauterborniella agrayloides	2	1		15	5	23	4.6	6.1
Microtendipes pedellus	1	27		1	1	30	6.0	11.7
Pagastiella ostansa	5	3	1	1	20	30	6.0	8.0
Parachironomus abortivus					1	1	0.2	0.4
Polypedilum (Pentapedilum) sordens	1					1	0.2	0.4
Polypedilum (s.lat.) sp.1		1		56	4	61	12.2	24.5
Polypedilum (s.lat.) sp.2			1		1	2	0.4	0.5
Polypedilum (Tripodura) simulans	3	1		1	1	6	1.2	1.1
Pseudochironomus spp.		4	3			7	1.4	1.9
Stenochironomus hilaris			5		1	6	1.2	2.2
Tribelos jucundum	3	4	2		1	10	2.0	1.6
Zavreliella marmorata	1			9	12	22	4.4	5.7
Tribe–Tanytarsini	1	2		22	9	34	6.8	9.2
Cladotanytarsus sp.					7	7	1.4	3.1
Paratanytarsus sp.		1				1	0.2	0.4
Tanytarsus/Micropsectra spp.	1	1		22	2	26	5.2	9.4
DIPTERA:Tabanidae			1			1	0.2	0.4
Chrysops sp.			1			1	0.2	0.4
DIPTERA:Tipulidae		3	4	1		8	1.6	1.8
Dactylolabis sp.			4	1		5	1.0	1.7
Erioptera sp.		3				3	0.6	1.3
DIPTERA:Misc.					1	1	0.2	0.4
Thaumaleidae:Thaumalea sp.					1	1	0.2	0.4
PELECYPODA	4	12	30	33	6	85	17.0	13.6
Pisidium casertanum	4	12	30	33	6	85	17.0	13.6

HARP LAKE APRIL 25 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
NEMATODA	2	1			1	4	0.8	0.8
Anatonchus sp.	1				1	2	0.4	0.5
Hydromermis sp.		1				1	0.2	0.4
Mermithidae	1					1	0.2	0.4
OLIGOCHAETA	32	16	4	8	21	81	16.2	11.1
Arteonais lomondi			1			1	0.2	0.4
Enchytraeidae	16	3		4	13	36	7.2	6.9
Limnodrilus hoffmeisteri	3	9		2		14	2.8	3.7
Limnodrilus udekemianus		2				2	0.4	0.9
Lumbriculus variegatus	2		3	2	6	13	2.6	2.2
Lumbriculidae		1				1	0.2	0.4
Tubificidae +baira	11	1			2	14	2.8	4.7
HIRUDINEA		1		2		3	0.6	0.9
Helobdella stagnalis		1		2		3	0.6	0.9
AMPHIPODA	140	47	88	30	55	360	72	43.5
Crangonyx laurentianus		1		7		8	1.6	3.0
Hyalella azteca	140	46	88	293	55	622	124.4	101.2
HYDRACARINA	11	1		2	10	24	4.8	5.3
Arrenurus (s.str.) americanus	1					1	0.2	0.4
Hydrodroma americanus				1		1	0.2	0.4
Hygrobates neocalliger				1		1	0.2	0.4
Unionicola crassipes laurentiana	10	1			10	21	4.2	5.3
EPHEMEROPTERA	94	30	18	48	52	242	48.4	29.0
Caenis diminuta	5			2	12	19	3.8	5.0
Eurylophella temporalis	25	6	16	16	19	82	16.4	6.9
Leptophlebia intermedia	62	24	2	30	18	136	27.2	22.1
Siphloplecton basale	1				2	3	0.6	0.9
Stenacron interpunctatum	1				1	2	0.4	0.5
ODONATA	37	9	5	30	6	87	17.4	15.0
Basiaeschna janata	2					2	0.4	0.9
Enallagma exsulans	2				1	3	0.6	0.9
Enallagma hageni	8	2	2	14	4	30	6	5.1
Epitheca cynosura	2			1		3	0.6	0.9
Gomphus exilis	18	7	3	15	1	44	8.8	7.4
Ischnura verticalis	5					5	1	2.2
PLECOPTERA		1		1	2	4	0.8	0.8
Nemoura trispinosa		1		1	2	4	0.8	0.8
HEMIPTERA	1	1			4	6	1.2	1.6
Hesperocorixa kennicotti					4	4	0.8	1.8
Hesperocorixa lobata	1					1	0.2	0.4
Hesperocorixa michiganensis		1				1	0.2	0.4
MEGALOPTERA					1	1	0.2	0.4
Sialis sp.					1	1	0.2	0.4
TRICHOPTERA	4	8	3	9	5	29	5.8	2.6
Agarodes cf. distinctus	2		1	3		6	1.2	1.3
Hydroptila sp.1		2				2	0.4	0.9
Lepidostoma sp.					1	1	0.2	0.4
Molanna ulmerina-uniophila					1	1	0.2	0.4
Mystacides sepulchralis		4		1	1	6	1.2	1.6
Nectopsyche sp.1	1					1	0.2	0.4
Oecetis cinerascens				1		1	0.2	0.4
Oecetis sp.1	1					1	0.2	0.4
Oecetis sp.2		2	1	1		4	0.8	0.8
Oecetis sp.4 (?ovara)				2		2	0.4	0.9

HARP LAKE APRIL 25 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
TRICHOPTERA cont'd	1	2	3	4	5			
Platycentropus sp.					1	1	0.2	0.4
Polycentropus sp.1			1			1	0.2	0.4
Ptilostomis cf. ocellifera					1	1	0.2	0.4
Triaenodes sp.1				1		1	0.2	0.4
LEPIDOPTERA					1	1	0.2	0.4
Crambus sp.					1	1	0.2	0.4
COLEOPTERA	7	2	4	11	1	25	5	4.1
Dubiraphia minima-vitatta	4	2	3	4	1	14	2.8	1.3
Ectopria nervosa				1		1	0.2	0.4
Macronychus sp.	1					1	0.2	0.4
Stenelmis crenata	2		1	6		9	1.8	2.5
DIPTERA	510	126	105	162	136	1039	207.8	170.2
DIPTERA:Ceratopogonidae	20	23	13	24	29	109	21.8	5.9
Bezzia sp.1	2					2	0.4	0.9
Bezzia sp.2/2A	1	2				3	0.6	0.9
Bezzia sp.4		6		2		8	1.6	2.6
Bezzia sp.5					2	2	0.4	0.9
Bezzia sp.6		1		1		2	0.4	0.5
Culicoides (O.) stellifer					4	4	0.8	1.8
Dasyhelea sp.1 (pale head)				5	3	8	1.6	2.3
Dasyhelea sp.2 (dark head)			1	1		2	0.4	0.5
Monohelea sp.		1			1	2	0.4	0.5
Probezzia sp.1	12	12	11	15	18	68	13.6	2.9
Probezzia sp.2	5	1				6	1.2	2.2
Probezzia sp.3			1		1	2	0.4	0.5
DIPTERA:Chironomidae	490	101	92	135	99	917	183.4	172.2
Subfam.-Podonominae					4	4	0.8	1.8
Parochlus kiefferi					4	4	0.8	1.8
Subfam.-Tanypodinae	209	47	68	97	40	461	92.2	69.0
Ablabesmyia (s.str.) spp.	1					1	0.2	0.4
Clinotanypus pinguis	6					6	1.2	2.7
Conchapelopia sp.	12	1	1	9	2	25	5	5.1
Labrundinia pilosella	1					1	0.2	0.4
Larsia canadensis	146	17	48	59	33	303	60.6	50.3
Procladius (s.lat.) spp.	42	29	17	28	4	120	24	14.3
Thienemannimyia prob. norena	1		2			3	0.6	0.9
Trissopelopia ogemawi				1	1	2	0.4	0.5
Subfam.-Prodiamesinae					3	3	0.6	1.3
Monodiamesa nr. bathyphila					3	3	0.6	1.3
Subfam.-Orthocladiinae	109	20	11	12	32	184	36.8	41.2
Bryophaenocladius sp.				1		1	0.2	0.4
Corynoneura nr. scutellata	1			1		2	0.4	0.5
Cricotopus (s.str.) nr. festivellus	1					1	0.2	0.4
Doithrix sp.2					1	1	0.2	0.4
Heterotrissocladius changi	11	2				13	2.6	4.8
Heterotrissocladius hirtapex	3	1			2	6	1.2	1.3
Hydrobaenus fusistylus		1				1	0.2	0.4
Limnophyes sp.					2	2	0.4	0.9
Nanocladius (s.str.) sp.					1	1	0.2	0.4
Parakiefferiella n.sp.1 (ELA)	4		1		2	7	1.4	1.7
Parametriocnemus lundbecki					2	2	0.4	0.9
Paraphaenocladius cf. nathecus					1	1	0.2	0.4
Psectrocladius (s.str.) litofilus	57	11	8	8	14	98	19.6	21.1
Psectrocladius (s.str.) simulans	1	5				6	1.2	2.2
Pseudosmittia prob. forcipata					1	1	0.2	0.4

HARP LAKE APRIL 25 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
Sunfam. Orthocladiinae cont'd	1	2	3	4	5			
Pseudosmittia sp.1				2		2	0.4	0.9
Rheocricoptus sp.			1		2	3	0.6	0.9
Tvetenia sp. bavarica gr.					3	3	0.6	1.3
Xylotopus par	1					1	0.2	0.4
Zalutschia obsepta	30		1		1	32	6.4	13.2
Subfam.-Chironominae	172	34	13	26	20	265	53	67.0
Tribe-Chironomini	158	33	7	20	14	232	46.4	63.1
Chironomus (s.str.) spp.					1	1	0.2	0.4
Cryptochironomus conus	2	3	1		2	8	1.6	1.1
Demicryptochironomus cuneatus	1					1	0.2	0.4
Dicrotendipes leucoscelis	2					2	0.4	0.9
Dicrotendipes modestus	8					8	1.6	3.6
Dicrotendipes tritomus	18	3		1	1	23	4.6	7.6
Endochironomus nigricans					1	1	0.2	0.4
Glyptotendipes sp. 1 gr."A"	4			1		5	1	1.7
Microtendipes pedellus	2					2	0.4	0.9
Nilothauma babiyi		2	1			3	0.6	0.9
Pagastiella ostansa	30		1	3	3	37	7.4	12.7
Parachironomus abortivus	1					1	0.2	0.4
Polypedilum (Pentapedilum) sordens	1					1	0.2	0.4
Polypedilum (Peotapedilum) tritum	1					1	0.2	0.4
Polypedilum (s.str.) scalaenum		2				2	0.4	0.9
Polypedilum (Tripodura) simulans	7		1	1		9	1.8	2.9
Pseudochironomus spp.	76	4	2	1	4	87	17.4	32.8
Stenochironomus hilaris	2			1	2	5	1	1.0
Stictochironomus sp(p.)		3	1	4		8	1.6	1.8
Tribelos jucundum	3	16		8		27	5.4	6.8
Tribe-Tanytarsini	14	1	6	6	6	33	6.6	4.7
Cladotanytarsus sp.	2		3	2	1	8	1.6	1.1
Parapsectra sp.		1			1	2	0.4	0.5
Paratanytarsus sp.	2			1		3	0.6	0.9
Stempellina sp.				2		2	0.4	0.9
Tanytarsus sp. curticornis gr.	2		3			5	1	1.4
Tanytarsus/Micropsectra spp.	8			1	4	13	2.6	3.4
DIPTERA:Tipulidae		1		2	8	11	2.2	3.3
Hexatoma sp.					1	1	0.2	0.4
Erioptera sp					1	1	0.2	0.4
Ormosia sp.				1		1	0.2	0.4
Tipulidae gen.1		1		1	3	5	1	1.2
Gonomyia sp.					3	3	0.6	1.3
DIPTERA:Misc.		1		1		2	0.4	0.5
Chaoboridae:Chaoborus (Sayomyia) punctipennis		1				1	0.2	0.4
Empididae:Hemerodromia sp.				1		1	0.2	0.4
GASTROPODA	12	15	2	4	1	34	6.8	6.3
Amnicola limosa	10	15	2	3	1	31	6.2	6.1
Ferrissia fragilis				1		1	0.2	0.4
Helisoma (s.str.) anceps	1					1	0.2	0.4
Menetus (Micro) dilatatus	1					1	0.2	0.4
PELECYPODA	19	15	7	14	13	68	13.6	4.3
Musculium securis	3	1				4	0.8	1.3
Pisidium casertanum	6	6	4	14	10	40	8	4.0
Pisidium ferrugineum		1				1	0.2	0.4
Pisidium nitidum	10	4	3		3	20	4	3.7
Pisidium variabile		3				3	0.6	1.3

PINCHER LAKE MAY 5 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
NEMATODA	2					2	0.4	0.9
Mermithidae	2					2	0.4	0.9
OLIGOCHAETA	24	5	12	7	10	58	11.6	7.4
Enchytraeidae					1	1	1	0.0
Limnodrilus udekemianus				1		1	0.2	0.4
Lumbriculus variegatus	21	5	11	6	9	52	10.4	6.4
Tubificidae +hairs	3		1			4	0.8	1.3
HIRUDINEA	3		1	1	4	9	1.8	1.6
Erpobdella punctata	3				1	4	0.8	1.3
Haemopis marmorata					1	1	1	0.0
Helobdella stagnalis				1	1	2	0.4	0.5
Nephelopsis obscura			1		1	2	0.4	0.5
AMPHIPODA	54	66	36	12	139	307	61.4	47.9
Crangonyx laurentianus	53	19	15	12	35	134	26.8	17.1
Hyalella azteca	1	47	21		104	173	34.6	43.2
COLLEMBOLA		1				1	0.2	0.4
Isotomurus (Hydroistoma) schaefferi		1				1	0.2	0.4
EPHEMEROPTERA	67	56	117	129	180	549	109.8	50.2
Eurylophella temporalis	20	30	22	31	48	151	30.2	11.1
Leptophlebia intermedia	47	26	95	98	132	398	79.6	42.6
ODONATA	4	4	7	11	7	33	6.6	2.9
Aeschna eremita			1			1	0.2	0.4
Cordulegaster sp.	1					1	0.2	0.4
Enallagma boreale	1	1	2	1	4	9	1.8	1.3
Gomphus exilis	1				2	3	0.6	0.9
Leucorrhinia hudsonica			2	5	1	8	1.6	2.1
Libellula julia	1	3	2	5		11	2.2	1.9
HEMIPTERA	5	1	1	6	2	15	3	2.3
Cenocorixa n.sp.	1					1	0.2	0.4
Notonecta insulata	4	1	1	6	2	14	2.8	2.2
MEGALOPTERA	1					1	0.2	0.4
Sialis sp.	1					1	0.2	0.4
TRICHOPTERA	40	10	18	18	11	97	19.4	12.1
Banksiola smithi	3		1	5		9	1.8	2.2
Limnephilidae	1		2			3	0.6	0.9
Molanna ulmerina-uniophila		1				1	0.2	0.4
Mystacides sepulchralis	1		1			2	0.4	0.5
Nectopsyche sp.1	7			2		9	1.8	3.0
Nyctiophylax affinis		1			1	2	0.4	0.5
Oecetis sp.1	15	2		1	1	19	3.8	6.3
Oecetis sp.2	9				1	10	2	3.9
Oxyethira sp.1	1		1			2	0.4	0.5
Platycentropus sp.	3	3	2	8	1	17	3.4	2.7
Polycentropus sp.1		2				2	0.4	0.9
Polycentropus sp.2			10	1	5	16	3.2	4.3
Pycnopsyche sp(p)			1	1	2	4	0.8	0.8
Triaenodes sp.1		1				1	0.2	0.4
LEPIDOPTERA		1				1	0.2	0.4
Geometridae (Terrestrial)		1				1	0.2	0.4
COLEOPTERA	9		8	1	1	19	3.8	4.3
Gyrinus pectoralis	7		4	1		12	2.4	3.0
Gyrinus ventralis?	1					1	0.2	0.4
Hydroporus (Neoporus) undulatus	1		4		1	6	1.2	1.6
DIPTERA	614	627	340	246	138	1965	393	219.7
DIPTERA:Ceratopogonidae	14	26	19	15	12	86	17.2	5.5
Bezzia sp.1	3	18	11	5	3	40	8	6.5
Bezzia sp.2/2A	5	3	2	9	9	28	5.6	3.3
Bezzia sp.3		5	5	1		11	2.2	2.6
Bezzia sp.4	4					4	0.8	1.8
Bezzia sp.6	2					2	0.4	0.9
Probezzia sp.1			1			1	0.2	0.4

PINCHER LAKE MAY 5 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
DIPTERA:Chironomidae	599	601	321	230	117	1868	373.6	218.9
Subfam.-Tanypodinae	82	157	43	77	13	372	74.4	54.0
Ablabesmyia (s.str.) spp.	16	53	8	3	2	82	16.4	21.2
Clinotanypus pinguis				1		1	0.2	0.4
Conchapelopia sp.	26	15	21	2	1	65	13	11.2
Larsia canadensis	1	1				2	0.4	0.5
Procladius (s.lat.) spp.	39	88	13	71	9	220	44	34.9
Zavrelimyia sp.			1		1	2	0.4	0.5
Subfam.-Orthocladiinae	24	23	33	33	25	138	27.6	5.0
Corynoneura nr. scutellata	3	3	1		2	9	1.8	1.3
Corynoneura sp.1	2	5				7	1.4	2.2
Cricotopus (Iso.) intersectus		1				1	0.2	0.4
Cricotopus (Iso.) sp. laricomalis gr			1			1	0.2	0.4
Heterotanytarsus nudalus	1		1			2	0.4	0.5
Heterotrissocladius hirtapex	9		1		2	12	2.4	3.8
Limnophyes sp.	2					2	0.4	0.9
Parametriocnemus lundbecki	4					4	0.8	1.8
Psectrocladius (Meso.) sp.			2			2	0.4	0.9
Psectrocladius (Mono.) cf. calcaratus			5	24	1	30	6	10.3
Psectrocladius (s.str.) litofilus	3	8	10	6	13	40	8	3.8
Zalutschia obsepta		6	12	3	7	28	5.6	4.5
Subfam.-Chironominae	493	421	245	120	79	1358	271.6	181.7
Tribe-Chironomini	161	248	117	78	38	642	128.4	80.9
Chironomus (s. str.) spp.		48	35	1	3	87	17.4	22.5
Cryptochironomus conus	5	2	2	1	2	12	2.4	1.5
Dicrotendipes leucoscelis	2	2	5	6		15	3	2.4
Dicrotendipes modestus	5	1				6	1.2	2.2
Dicrotendipes tritomus	36	70	29	18	5	158	31.6	24.5
Endochironomus nigricans			3	2	3	8	1.6	1.5
Lauterborniella agrayloides		11	2			13	2.6	4.8
Microtendipes pedellus	67	5	19	3	4	98	19.6	27.3
Pagastiella ostansa		22	3	7		32	6.4	9.2
Paratendipes albimanus					2	2	0.4	0.9
Phaenopsectra sp.	1					1	0.2	0.4
Polypedilum (s.l.) sp.3	1	2	1	1		5	1	0.7
Polypedilum (Tripodura) simulans		30	2	6		38	7.6	12.8
Pseudochironomus spp.	2	5	3	4	3	17	3.4	1.1
Stenochironomus hilaris	2		1			3	0.6	0.9
Stictochironomus sp(p).					1	1	0.2	0.4
Tribelos jucundum	40	45	12	29	15	141	28.2	14.7
Zavreliella marmorata		5				5	1	2.2
Tribe-Tanytarsini	332	173	128	42	41	716	143.2	119.8
Cladotanytarsus spp.	20	65	18	1	1	105	21	26.2
Paratanytarsus spp.	6	17	2	3	4	32	6.4	6.1
Stempellinella sp.	5		3			8	1.6	2.3
Tanytarsus sp. curticornis gr.	2					2	0.4	0.9
Tanytarsus sp. 'Pc-brush'	5		6	1		12	2.4	2.9
Tanytarsus/Micropsectra spp.	294	91	99	37	36	557	111.4	106.2
DIPTERA:Tabanidae				1		1	0.2	0.4
Chrysops sp.				1		1	0.2	0.4
DIPTERA:Misc.	1				9	10	2	3.9
Chaoboridae:Chaoborus (Sayomyia) punctipennis					9	9	1.8	4.0
Phoridae	1					1	0.2	0.4
PELECYPODA	46	13	1	9	11	80	16	17.4
Pisidium casertanum	46	13	1	9	11	80	16	17.4

PLASTIC LAKE APRIL 26 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
OLIGOCHAETA	19	8	2	19	9	57	11.4	7.4
Enchytraeidae	2					2	0.4	0.9
Limnodrilus claparedianus				1		1	0.2	0.4
Limnodrilus hoffmeisteri	1					1	0.2	0.4
Lumbriculus variegatus	16	7	2	18	9	52	10.4	6.6
Tubificidae +hairs		1				1	0.2	0.4
HIRUDINEA		2		1		3	0.6	0.9
Gloiobdella elongata		2				2	0.4	0.9
Helobdella stagnalis				1		1	0.2	0.4
AMPHIPODA	31	11	1	52	4	99	19.8	21.5
Crangonyx gracilis	24	9	1	19	4	57	11.4	9.8
Crangonyx laurentianus	1					1	0.2	0.4
Hyalella azteca	6	2		33		41	8.2	14.1
COLLEMBOLA			1			1	0.2	0.4
Metisotoma sp.			1			1	0.2	0.4
EPHEMEROPTERA	31	14	10	31	3	89	17.8	12.7
Eurylophella temporalis	2	2	3	2	2	11	2.2	0.4
Leptophlebia intermedia	29	11	4	29	1	74	14.8	13.5
Stenacron interpunctatum		1	3			4	0.8	1.3
ODONATA	6	3	2	8	2	21	4.2	2.7
Aeshna umbrosa		1	1			2	0.4	0.5
Basiaeschna janata			1			1	0.2	0.4
Enallagma hageni				1	1	2	0.4	0.5
Gomphus exilis	2					2	0.4	0.9
Ischnura verticalis	3			7	1	11	2.2	2.9
Libellula julia	1	1				2	0.4	0.5
Somatochlora williamsoni		1				1	0.2	0.4
PLECOPTERA					9	9	1.8	4.0
Nemoura trispinosa					9	9	1.8	4.0
HEMIPTERA				3	1	4	0.8	1.3
Cenocorixa n.sp.				1		1	0.2	0.4
Hesperocorixa atopodonta					1	1	0.2	0.4
Hesperocorixa kennicotti				1		1	0.2	0.4
Sigara (Arcto.) decoratella				1		1	0.2	0.4
MEGALOPTERA				4	1	5	1	1.7
Sialis sp.				4	1	5	1	1.7
TRICHOPTERA	7	11	5	3	3	29	5.8	3.3
Hydroptila sp.1		1				1	0.2	0.4
Lepidostoma sp.		1				1	0.2	0.4
Lype diversa			1			1	0.2	0.4
Nyctiophylax affinis			1			1	0.2	0.4
Oecetis sp.1	2	2		2		6	1.2	1.1
Oecetis sp.2	4	1				5	1	1.7
Oxyethira sp.1		1		1		2	0.4	0.5
Oxyethira sp.2	1					1	0.2	0.4
Polycentropus sp.1					1	1	0.2	0.4
Polycentropus sp.2		1	3			4	0.8	1.3
Pycnopsyche sp.1		2				2	0.4	0.9
Pycnopsyche sp.2		2			2	4	0.8	1.1

PLASTIC LAKE APRIL 26 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
LEPIDOPTERA			6	1	1	8	1.6	2.5
Eoparargyractis sp.					1	1	0.2	0.4
Geometridae (Terrestrial)			6	1		7	1.4	2.6
COLEOPTERA			2	1	3	6	1.2	1.3
Agabus sp.					2	2	0.4	0.9
Dubiraphia minima-vitatta			1			1	0.2	0.4
Hydrochus sp.				1	1	2	0.4	0.5
Scirtes sp.1			1			1	0.2	0.4
DIPTERA	221	111	87	136	107	662	132.4	52.5
DIPTERA:Ceratopogonidae	24	9	4	17	23	77	15.4	8.7
Bezzia sp.1	6	6		5	3	20	4	2.5
Bezzia sp.2/2A	10					10	2	4.5
Bezzia sp.3	4		1		5	10	2	2.3
Bezzia sp.4				1		1	0.2	0.4
Bezzia sp.5	3			4		7	1.4	1.9
Bezzia sp.6				1		1	0.2	0.4
Culicoides (O.) stellifer			1	1	6	8	1.6	2.5
Porcipomyia sp.				1		1	0.2	0.4
Dasyhelea sp.1 (pale head)				2		2	0.4	0.9
Dasyhelea sp.2 (dark head)					1	1	0.2	0.4
Monohelea sp.1	1				3	4	0.8	1.3
Monohelea sp.2		1		2	1	4	0.8	0.8
Isohelea sp.		1	1			2	0.4	0.5
Palpomyia sp.1 tibialis gr.					3	3	0.6	1.3
Probezzia sp.1		1				1	0.2	0.4
Probezzia sp.2			1			1	0.2	0.4
Probezzia sp.3					1	1	0.2	0.4
DIPTERA:Chironomidae	192	99	83	114	65	553	110.6	49.0
Subfam.-Podonominae					2	2	0.4	0.9
Parochlus kiefferi					2	2	0.4	0.9
Subfam.-Tanypodinae	34	26	19	34	6	119	23.8	11.8
Ablabesmyia (s.str.) spp.	8	2	4	10		24	4.8	4.1
Clinotanypus (s.str.) pinguis	2	2		2		6	1.2	1.1
Conchapelopia sp.	7	14	3	12	2	38	7.6	5.3
Larsia canadensis	3		3			6	1.2	1.6
Larsia indistincta				5		5	1	2.2
Natarsia baltimoreus					2	2	0.4	0.9
Procladius (s.lat.) spp.	14	7	9	3		33	6.6	5.4
Zavrelimyia sp.		1		2	2	5	1	1.0
Subfam.-Orthocladiinae	104	16	28	49	50	247	49.4	33.7
Acricotopus sp.					1	1	0.2	0.4
Corynoneura lacustris	1	2		6		9	1.8	2.5
Cricotopus (s.str.) nr. albiforceps				1		1	0.2	0.4
Doithrix sp.1	1					1	0.2	0.4
Heterotrissocladius changi		2	2	1	4	9	1.8	1.5
Heterotrissocladius hirtapex	64					64	12.8	28.6
Limnophyes sp.	2			5	3	10	2	2.1
Parametriocnemus lundbecki	4		1		2	7	1.4	1.7
Paraphaenocladius cf. nathecus				1		1	0.2	0.4
Psectrocladius (Mono.) cf. calcaratus		2				2	0.4	0.9
Psectrocladius (s.str.) litofilus	15	9	21	10	11	66	13.2	4.9
Psectrocladius (s.str.) simulans	2	1	2	7	2	14	2.8	2.4
Pseudosmittia prob. forcipata	11			17	16	44	8.8	8.3

PLASTIC LAKE APRIL 26 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
Subfam.-Orthocladiinae cont'd	1	2	3	4	5			
Smittia sp.				1		1	0.2	0.4
Stackelbergina n.sp.	1		2			3	0.6	0.9
Thienemanniella sp. A	3					3	0.6	1.3
Tvetenia sp. bavarica gr.					9	9	1.8	4.0
Zalutschia obsepta					2	2	0.4	0.9
Subfam.-Chironominae	54	57	36	31	7	185	37	20.2
Tribe-Chironomini	26	48	26	20	4	124	24.8	15.8
Chironomus (Campto.) ?tentans	3	1		2		6	1.2	1.3
Cladopelma sp.				1	1	2	0.4	0.5
Cryptochironomus conus	1	1		3		5	1	1.2
Dicrotendipes leucoscelis			1			1	0.2	0.4
Dicrotendipes tritomus	2			2		4	0.8	1.1
Endochironomus nigricans	4	3	2	1		10	2	1.6
Lauterborniella agrayloides				2		2	0.4	0.9
Microtendipes pedellus	2					2	0.4	0.9
Paratendipes cf. nudisquama					1	1	0.2	0.4
Polypedilum (s.lat.) sp.3	1			1		2	0.4	0.5
Polypedilum (Tripodura) simulans	7	18	2	2	1	30	6	7.1
Pseudochironomus articaudus				1		1	0.2	0.4
Pseudochironomus spp.	3	1		1		5	1	1.2
Stenochironomus hilaris	3	2		1	1	7	1.4	1.1
Tribelos jucundum		22	21	2		45	9	11.4
Zavreliella marmorata				1		1	0.2	0.4
Tribe-Tanytarsini	28	9	10	11	3	61	12.2	9.4
Cladotanytarsus sp.	11			3		14	2.8	4.8
Paratanytarsus sp.			2	2		4	0.8	1.1
Stempellinella sp.		1	5			6	1.2	2.2
Tanytarsus/Micropsectra spp.	17	8	3	6	3	37	7.4	5.8
DIPTERA:Tipulidae	5				9	14	2.8	4.1
Erioptera sp.	3					3	0.6	1.3
Gonomyia sp.	2					2	0.4	0.9
Tipulidae gen. indet. sp.1					9	9	1.8	4.0
DIPTERA:Misc.		3		5	10	18	3.6	4.2
Cecidomyiidae				4	4	8	1.6	2.2
Dolichopodidae				1	5	6	1.2	2.2
Empididae:Hemerodromia sp.		3				3	0.6	1.3
Platypezidae:Platypeza sp.1					1	1	0.2	0.4
DIPTERA-indet./terrestrial forms		1			3	4	0.8	1.3
GASTROPODA		1				1	0.2	0.4
Amnicola limosa		1				1	0.2	0.4
PELECYPODA	13	11	6	36	3	69	13.8	13.0
Pisidium casertanum	7	5	4	12	3	31	6.2	3.6
Pisidium ferrugineum				1		1	0.2	0.4
Pisidium lilljeborgi				1		1	0.2	0.4
Pisidium nitidium	4	4	2	22		32	6.4	8.9
Pisidium variabile	2	2				4	0.8	1.1

SKIDWAY LAKE APRIL 20 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
DIPTERA	184	327	239	272	91	1113	222.6	90.0
DIPTERA:Ceratopogonidae	17	9	18	33	14	91	18.2	9.0
Bezzia sp.1	13	4	14	26	12	69	13.8	7.9
Bezzia sp.2/2A	4	4	3	6		17	3.4	2.2
Bezzia sp.3			1		1	2	0.4	0.5
Bezzia sp.4					1	1	0.2	0.4
Bezzia sp.5				1		1	0.2	0.4
Probezzia sp.4		1				1	0.2	0.4
DIPTERA:Chironomidae	167	318	221	237	77	1020	204.0	89.3
Subfam.-Tanypodinae	52	15	50	43	9	169	33.8	20.3
Ablabesmyia (s.str.) spp.	4	2	8	2	1	17	3.4	2.8
Conchapelopia sp.	16	6	3	7	4	36	7.2	5.2
Guttipelopia guttipennis		2	7	5		14	2.8	3.1
Larsia indistincta	3		1	1	1	6	1.2	1.1
Natarsia baltimoreus				5		5	1.0	2.2
Procladius (s.lat) spp.	29	5	31	23	3	91	18.2	13.3
Subfam.-Orthocladiinae	28	16	75	19	11	149	29.8	26.0
Corynoneura lobata	1					1	0.2	0.4
Heterotrissocladius changi	1					1	0.2	0.4
Parametriocnemus lundbecki	1		1			2	0.4	0.5
Psectrocladius (Mono.) cf. calcaratus	1		1	2		4	0.8	0.8
Psectrocladius (s.str.) litofilus	2	9	61	6	1	79	15.8	25.5
Psectrocladius (s.str.) simulans	1					1	0.2	0.4
Stackelbergina n.sp.	2	1		2		5	1.0	1.0
Zalutschia obsepta	19	6	12	9	10	56	11.2	4.9
Subfam.-Chironominae	87	287	96	175	57	702	140.4	92.8
Tribe-Chironomini	82	263	68	155	42	610	122.0	89.3
Chironomus (s.str.) spp.	64	8	15	91	2	180	36.0	39.3
Cryptochironomus conus				1		1	0.2	0.4
Dicrotendipes modestus	1	11	1	9		22	4.4	5.2
Dicrotendipes tritomus			1	2	1	4	0.8	0.8
Endochironomus nigricans	4					4	0.8	1.8
Glyptotendipes sp. 1 gr."A"				1		1	0.2	0.4
Lauterborniella agrayloides	1	3	1		17	22	4.4	7.1
Microtendipes pedellus	2	209	24	13	4	252	50.4	89.1
Nilothauma babiyi		1	1			2	0.4	0.5
Omisus ?caledonicus	3	1	2	18		24	4.8	7.5
Phaenopsectra sp.	1	1			1	3	0.6	0.5
Polypedilum (s.lat.) sp.1	1	1	1	2	6	11	2.2	2.2
Polypedilum (s.lat.) sp.2	1	1			1	3	0.6	0.5
Polypedilum (s.lat.) sp.3		1		1	1	3	0.6	0.5
Polypedilum (Tripodura) simulans			3	3		6	1.2	1.6
Pseudochironomus spp.		1				1	0.2	0.4
Stenochironomus hilaris		1				1	0.2	0.4
Synendotendipes lepidus		2	3	6		11	2.2	2.5
Tribelos jucundum	3	21	15	6	2	47	9.4	8.3
Zavreliella marmorata	1	1	1	2	7	12	2.4	2.6
Tribe-Tanytarsini	5	24	28	20	15	92	18.4	8.9
Cladotanytarsus sp.	1		1	1		3	0.6	0.5
Tanytarsus/Micropsectra spp.	4	24	27	19	15	89	17.8	9.0
DIPTERA:Tabanidae				1		1	0.2	0.4
Chrysops n.sp.				1		1	0.2	0.4
DIPTERA:Misc.				1		1	0.2	0.4
Chaoboridae:Chaoborus (Sayomyia) punctipennis				1		1	0.2	0.4
PELECYPODA		18	17			35	7.0	9.6
Pisidium casertanum		18	17			35	7.0	9.6

WESTWARD LAKE MAY 3 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
NEMATODA			1		1	2	0.4	0.5
Anatonchus sp.			1		1	2	0.4	0.5
OLIGOCHAETA	1	5	7	5	16	34	6.8	5.0
Enchytraeidae	1		2		13	16	3.2	5.0
Lumbriculus variegatus		5	4	5		14	2.8	2.3
Tubificidae +hairs			1		3	4	0.8	1.2
HIRUDINEA	3	1			1	5	1	1.1
Erpobdella punctata					1	1	0.2	0.4
Oloiobdella elongata	1					1	0.2	0.4
Haemopis marmorata	1					1	0.2	0.4
Helobdella stagnalis	1	1				2	0.4	0.5
AMPHIPODA	40	292	110	102	106	650	130	85.0
Crangonyx laurentianus	10	24	12	4	9	59	11.8	6.6
Hyalella azteca	30	268	98	98	97	591	118.2	79.4
DECAPODA	1					1	0.2	0.4
Cambarus bartoni	1					1	0.2	0.4
HYDRACARINA	1		1			2	0.4	0.5
Unionicola crassipes laurentiana	1					1	0.2	0.4
Terrestrial forms			1			1	0.2	0.4
COLLEMBOLA			1			1	0.2	0.4
Polsomia sp.			1			1	0.2	0.4
EPHEMEROPTERA	85	180	98	96	22	481	96.2	50.3
Caenis diminuta	5	58	8	11		82	16.4	21.1
Eurylophella temporalis	30	100	75	76	7	288	57.6	33.9
Leptophlebia intermedia	49	2	14	2	9	76	15.2	17.5
Siphloplecton basale	1	18	1	4	6	30	6	6.3
Stenacron interpunctatum		1		3		4	0.8	1.3
Stenonema (s.str.) femoratum		1				1	0.2	0.4
ODONATA	1		1		3	5	1	1.1
Aeshna umbrosa	1		1			2	0.4	0.5
Enallagma hageni					1	1	0.2	0.4
Gomphus exilis					2	2	0.4	0.8
HEMIPTERA		1	1	2		4	0.8	0.7
Hesperocorixa michiganensis			1	1		2	0.4	0.5
Notonecta undulata		1		1		2	0.4	0.5
TRICHOPTERA	1	5	19	1		26	5.2	7.1
Limnephilidae			1			1	0.2	0.4
Nectopsyche sp.1		1	2			3	0.6	0.8
Oecetis sp.1			3			3	0.6	1.2
Oecetis sp.2			5			5	1	2.0
Platycentropus sp.	1	1				2	0.4	0.5
Triaenodes sp.1		3	7	1		11	2.2	2.6
Triaenodes sp.2			1			1	0.2	0.4
LEPIDOPTERA			1		2	3	0.6	0.9
Acentria sp.					1	1	0.2	0.4
Eoparargyractis sp.					1	1	0.2	0.4
Geometridae (Terrestrial)			1			1	0.2	0.4
COLEOPTERA	12	13	9	1	1	36	7.2	5.2
Dineutus nigrior	2					2	0.4	0.8
Gyrinus frosti	3		1			4	0.8	1.2
Gyrinus pectoralis	6	3				9	1.8	2.4
Hydroporus (Neoporus) undulatus	1	3		1	1	6	1.2	1.0
Stenelmis crenata		7	8			15	3	3.7
DIPTERA	86	45	218	39	116	504	100.8	65.0
DIPTERA:Ceratopogonidae	4	2	5	1	41	53	10.6	15.3
Bezzia sp.1			2			2	0.4	0.8
Bezzia sp.3	1	2	2			5	1	0.9
Bezzia sp.4			1		8	9	1.8	3.1
Bezzia sp.6	2					2	0.4	0.8
Dasyhelea sp.1 (pale head)					1	1	0.2	0.4
Dasyhelea sp.2 (dark head)					32	32	6.4	12.8
Monohelea sp.	1					1	0.2	0.4
Probezzia sp.1				1		1	0.2	0.4

WESTWARD LAKE MAY 3 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
DIPTERA:Chironomidae	82	42	212	38	73	447	89.4	63.6
Subfam.-Tanypodinae	36	3	62	13	12	126	25.2	21.4
Ablabesmyia (s.str.) spp.	1	2	24	5	4	36	7.2	8.5
Clinotanypus pinguis	2					2	0.4	0.8
Conchapelopia sp.		1	13		3	17	3.4	4.9
Larsia canadensis	2		4	4	3	13	2.6	1.5
Procladius (s.lat.) spp.	31		21	4	2	58	11.6	12.2
Subfam.-Prodiamesinae				2	2	4	0.8	1.0
Monodiamesa nr. bathyphila				2	2	4	0.8	1.0
Subfam.-Orthocladiinae	5	10	14	5	8	42	8.4	3.4
Corynoneura nr. scutellata	3	2	1	2	5	13	2.6	1.4
Heterotanytarsus nudalus			1			1	0.2	0.4
Heterotrissocladius changi		1	2	1	1	5	1	0.6
Heterotrissocladius hirtapex		1	1			2	0.4	0.5
Parakiefferiella n.sp.1 (ELA)					1	1	0.2	0.4
Parametriocnemus lundbecki	1	1				2	0.4	0.5
Paraphaenocladius cf. nathecus			1			1	0.2	0.4
Psectrocladius (s.str.) litofilus	1	5	6	2	1	15	3	2.1
Psectrocladius (s.str.) simulans			1			1	0.2	0.4
Zalutschia obsepta			1			1	0.2	0.4
Subfam.-Chironominae	41	29	136	18	51	275	55	42.0
Tribe-Chironomini	23	14	65	14	7	123	24.6	20.8
Chironomus (s.str.) spp.	1	1				2	0.4	0.5
Cryptochrinomus conus			5	5	1	11	2.2	2.3
Dicrotendipes leucoscelis			1			1	0.2	0.4
Dicrotendipes modestus			1			1	0.2	0.4
Dicrotendipes tritomus	8	6	39	4	4	61	12.2	13.5
Glyptotendipes sp. 1 gr."A"			1			1	0.2	0.4
Lauterborniella agrayloides			1			1	0.2	0.4
Microtendipes pedellus	2	1	11			14	2.8	4.2
Nilothauma babiyi		1				1	0.2	0.4
Paratendipes albimanus			1	1		2	0.4	0.5
Paratendipes cf. nudisquama				1		1	0.2	0.4
Phaenopsectra sp.	1		1			2	0.4	0.5
Phaenopsectra flavipes	3	1	1			5	1	1.1
Pseudochironomus articaudus			1		1	2	0.4	0.5
Pseudochironomus spp.	1	4	1			6	1.2	1.5
Stictochironomus sp(p.)			1	3	1	5	1	1.1
Tribelos jucundum	7					7	1.4	2.8
Tribe-Tanytarsini	18	15	71	4	44	152	30.4	24.2
Cladotanytarsus sp.	1	4	37		1	43	8.6	14.3
Parapsectra sp.	1					1	0.2	0.4
Paratanytarsus sp.	4	2	8	1	24	39	7.8	8.4
Stempellinella sp.	1	4	2	2		9	1.8	1.3
Tanytarsus/Micropsectra spp.	11	5	24	1	19	60	12	8.5
DIPTERA:Misc.		1	1		2	4	0.8	0.7
Cecidomyiidae					1	1	0.2	0.4
Empididae:Hemerodromia sp.		1			1	2	0.4	0.5
Thaumaleidae:Thaumalea sp.			1			1	0.2	0.4
DIPTERA-indet./terrestrial forms		1				1	0.2	0.4
GASTROPODA			1		1	2	0.4	0.5
Amnicola limosa			1		1	2	0.4	0.5
PELECYPODA	20	22	5	8	89	144	28.8	34.4
Pisidium casertanum	3	3	4	8	38	56	11.2	15.1
Pisidium lillijeborgi	3					3	0.6	1.2
Pisidium variabile					1	1	0.2	0.4
Pisidium nitidum	14	19	1		50	84	16.8	20.3

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
OLIGOCHAETA	26		2	3		31	6.2	11.1
Enchytraeidae	2		2			4	0.8	1.1
Limnodrilus hoffmeisteri	20					20	4	8.9
Lumbriculus variegatus	4			1		5	1	1.7
Stylodrilus heringianus				1		1	0.2	0.4
Tubificidae +hairs				1		1	0.2	0.4
AMPHIPODA	34	49	77	218	61	439	87.8	74.5
Crangonyx laurentianus				2	1	3	0.6	0.9
Hyalella azteca	34	49	77	216	60	436	87.2	73.7
DECAPODA					1	1	0.2	0.4
Orconectes propinquus					1	1	0.2	0.4
HYDRACARINA	1			1		2	0.4	0.5
Arrenurus (s.str.) americanus	1					1	0.2	0.4
Huitfeldtia rectipes				1		1	0.2	0.4
EPHEMEROPTERA	73	36	19	46	56	230	46	20.4
Caenis punctata	37	17		12	1	67	13.4	15.0
Eurylophella temporalis	9	3	6	4	7	29	5.8	2.4
Hexagenia rigida	1					1	0.2	0.4
Leptophlebia intermedia	26		10	16	46	98	19.6	17.5
Siphloplecton basale		7	2	9	1	19	3.8	4.0
Stenacron interpunctatum		1				1	0.2	0.4
Stenonema (s.str.) femoratum		8	1	5	1	15	3	3.4
ODONATA	6			26	8	40	8	10.7
Enallagma hageni	5			19	2	26	5.2	8.0
Epitheca cynosura				1	2	3	0.6	0.9
Gomphus exilis	1			1	3	5	1	1.2
Ischnura verticalis				5	1	6	1.2	2.2
PLECOPTERA	15					15	3	6.7
Nemoura trispinosa	15					15	3	6.7
MEGALOPTERA	4					4	0.8	1.8
Sialis sp.	4					4	0.8	1.8
TRICHOPTERA	18		2	10	5	35	7	7.2
Agarodes cf. distinctus				2	4	6	1.2	1.8
Lepidostoma sp.	1		1	1		3	0.6	0.5
Molanna ulmerina-uniophila				1	1	2	0.4	0.5
Mystacides sepulchralis				1		1	0.2	0.4
Oecetis sp.1	2			2		4	0.8	1.1
Oecetis sp.2				1		1	0.2	0.4
Orthotrichia sp.	1					1	0.2	0.4
Oxyethira sp.1	2					2	0.4	0.9
Phylocentropus sp.	2					2	0.4	0.9
Platycentropus sp.	1			1		2	0.4	0.5
Polycentropus sp.1	2					2	0.4	0.9
Polycentropus sp.2			1			1	0.2	0.4
Ptilostomis cf. ocellifera	1			1		2	0.4	0.5
Pycnopsyche sp(p)	6					6	1.25	2.2
COLEOPTERA	2	4	1	5	13	25	5	4.7
Dineutus nigrior					10	10	2	4.5
Dubiraphia minima-vitatta					1	1	0.2	0.4
Haliplus pantherinus	1					1	0.2	0.4
Hydrochus sp.	1					1	0.2	0.4
Hydroporus (Neoporus) undulatus		1				1	0.2	0.4
Scirtes sp.1		1	1			2	0.4	0.5
Stenelmis crenata		2		5	2	9	1.8	2.0
DIPTERA	229	34	45	289	60	657	131.4	118.8
DIPTERA:Ceratopogonidae	22		5	7	2	36	7.2	8.7
Bezzia sp.1	2					2	0.4	0.9
Bezzia sp.2/2A	1					1	0.2	0.4
Bezzia sp.3				1		1	0.2	0.4
Bezzia sp.6	1					1	0.2	0.4
Palpomyia sp.2	1					1	0.2	0.4
Probezzia sp.1	16		5	6	2	29	5.8	6.2
Probezzia sp.3	1					1	0.2	0.4

YOUNG LAKE APRIL 22 1988

TAXONOMIC NAME	SITE					TOTAL	MEAN	STD
	1	2	3	4	5			
DIPTERA:Chironomidae	203	34	40	282	58	617	123.4	112.6
Subfam.-Tanypodinae	93	9	5	124	18	249	49.8	54.9
Ablabesmyia (s.str.) spp.	8	1	1	15		25	5	6.4
Clinotanypus (s.str.) pinguis				4		4	0.8	1.8
Conchapelopia sp.	7		3	4	3	17	3.4	2.5
Labrundinia pilosella	1					1	0.2	0.4
Larsia canadensis	49	7		90	13	159	31.8	37.6
Natarsia baltimoreus	1					1	0.2	0.4
Procladius (s.lat.) spp.	27	1	1	11	2	42	8.4	11.2
Subfam.-Prodiamesinae	1					1	0.2	0.4
Monodiamesa nr.bathyphiila	1					1	0.2	0.4
Subfam.-Orthocladiinae	52	20	31	51	33	187	37.4	13.8
Brillia parva	1					1	0.2	0.4
Bryophaenocladius sp.			4			4	0.8	1.8
Corynoneura lacustris		1				1	0.2	0.4
Corynoneura nr. scutellata	1	10		3	1	15	3	4.1
Corynoneura sp.2	5					5	1	2.2
Cricotopus (s.str.) nr. festivellus		1		13	2	16	3.2	5.5
Diplocladius sp.	1					1	0.2	0.4
Heterotanytarsus nudalus	2					2	0.4	0.9
Heterotrissocladius changi			2			2	0.4	0.9
Heterotrissocladius hirtapex	23	3	3	13	6	48	9.6	8.5
Limnophyes sp.	2	1				3	0.6	0.9
Parakiefferiella n.sp.1 (ELA)		1		1	1	3	0.6	0.5
Parametriocnemus lundbecki			2			2	0.4	0.9
Paraphaenocladius cf. nathecus	2					2	0.4	0.9
Platysmittia? sp.	1					1	0.2	0.4
Psectrocladius (s.str.) litofilus	10	1	14	15	23	63	12.6	8.0
Psectrocladius (s.str.) simulans	2	1		1		4	0.8	0.8
Pseudorthocladius sp.		1				1	0.2	0.4
Rheocricotopus sp.	2		6	5		13	2.6	2.8
Subfam.-Chironominae	57	5	4	107	7	180	36	45.6
Tribe-Chironomini	48	2	4	17	5	76	15.2	19.3
Cryptochironomus conus	5		1			6	1.2	2.2
Demicryptochironomus cuneatus	1					1	0.2	0.4
Dicrotendipes tritomus	2				1	3	0.6	0.9
Endochironomus nigricans			2	5	1	8	1.6	2.1
Glyptotendipes sp. 1 gr."A"	2			5		7	1.4	2.2
Microtendipes pedellus				2	1	3	0.6	0.9
Paracladopelma galaptera	1					1	0.2	0.4
Paracladopelma undine	2					2	0.4	0.9
Paralauterborniella nigrohalterale				1		1	0.2	0.4
Polypedilum (s.lat.) sp.4					1	1	0.2	0.4
Polypedilum (Tripodura) simulans	6			2	1	9	1.8	2.5
Pseudochironomus spp.	10	1				11	2.2	4.4
Stenochironomus hilaris				2		2	0.4	0.9
Stictochironomus sp.1/3	3		1			4	0.8	1.3
Tribelos jucundum	16	1				17	3.4	7.1
Tribe-Tanytarsini	9	3		90	2	104	20.8	38.8
Cladotanytarsus spp.	5	1		1		7	1.4	2.1
Paratanytarsus spp.				3	1	4	0.8	1.3
Stempellinella sp.	1					1	0.2	0.4
Tanytarsus sp. curticornis gr.	1	2				3	0.6	0.9
Tanytarsus/Micropsectra spp.	2			86	1	89	17.8	38.1
DIPTERA:Misc.	4					4	0.8	1.8
Cecidomyiidae	1					1	0.2	0.4
Dixidae:Dixella sp.	1					1	0.2	0.4
Ptychopteridae:Battacomorpha sp.	2					2	0.4	0.9
GASTROPODA	4	1	2	14		21	4.2	5.7
Amnicola limosa	3	1		12		16	3.2	5.1
Helisoma (s.str.) anceps	1					1	0.2	0.4
Physella (s.str.) gyrina			2	2		4	0.8	1.1
PELECYPODA	4	1	2	4	1	12	2.4	1.5
Pisidium casertanum		1		2		3	0.6	0.9
Pisidium ferrugineum					1	1	0.2	0.4
Pisidium nitidium			2	2		4	0.8	1.1
Pisidium variabile	4					4	0.8	1.8

APPENDIX 6

SPRING 1988 BENTHOS SUMMARY BY TAXONOMIC ORDER OR SUB-FAMILY

BLUE CHALK LAKE MAY 9 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA	1	1		2		2
OLIGOCHAETA	5	5	1	3	2	7
HIRUDINEA			1			1
AMPHIPODA	1	1	2	2	1	2
HYDRACARINA		1	1		1	1
COLLEMBOLA		1				1
EPHEMEROPTERA	3	6	3	5	4	7
ODONATA	2	4	2	2	2	6
HEMIPTERA		1				1
MEGALOPTERA			1			1
TRICHOPTERA	5	4	4	2	2	11
LEPIDOPTERA					1	1
COLEOPTERA	3	3	1	2	2	3
DIPTERA TOTAL	26	23	17	17	18	45
DIPTERA:Ceratopogonidae	2	1	2	4	2	5
DIPTERA:Chironomidae	24	22	15	13	14	38
Subfam.-Tanypodinae	5	6	6	5	5	8
Subfam.-Prodiamesinae					1	1
Subfam.-Orthocladiinae	5	6	2	3	3	10
Subfam.-Chironominae	14	10	7	5	5	19
Tribe-Chironomini	8	7	5	2	3	13
Tribe-Tanytarsini	6	3	2	3	2	6
DIPTERA:Tabanidae					1	1
DIPTERA:Tipulidae					1	1
GASTROPODA			1			1
PELECYPODA	1	1	1	1	1	2
TOTAL SPECIES	47	51	35	36	34	92

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA	2	2		3		7
OLIGOCHAETA	5	8	6	10	4	33
HIRUDINEA			1			1
AMPHIPODA	120	142	128	91	115	596
HYDRACARINA		1	1		1	3
COLLEMBOLA		1				1
EPHEMEROPTERA	7	58	12	28	45	150
ODONATA	6	12	7	2	6	33
HEMIPTERA		1				1
MEGALOPTERA			2			2
TRICHOPTERA	5	6	4	2	2	19
LEPIDOPTERA					1	1
COLEOPTERA	4	9	4	8	12	37
DIPTERA TOTAL	209	177	102	131	85	704
DIPTERA:Ceratopogonidae	23	2	9	32	35	101
DIPTERA:Chironomidae	186	175	93	99	48	601
Subfam.-Tanypodinae	124	134	73	77	27	435
Subfam.-Prodiamesinae					1	1
Subfam.-Orthocladiinae	14	14	4	10	5	47
Subfam.-Chironominae	48	27	16	12	15	118
Tribe-Chironomini	22	10	12	5	7	56
Tribe-Tanytarsini	26	17	4	7	8	62
DIPTERA:Tabanidae					1	1
DIPTERA:Tipulidae					1	1
GASTROPODA			1			1
PELECYPODA	4	4	2	5	6	21
TOTAL INDIVIDUALS	362	421	270	280	277	1610

CLEAR LAKE APRIL 28 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
TURBELLARIA		1				1
NEMATODA	1	1	1	1	1	1
OLIGOCHAETA	3	2	1	3	2	4
HIRUDINEA			1	1		2
AMPHIPODA	2	2	2	2	2	2
DECAPODA			1			1
EPHEMEROPTERA	3	3	3	4	5	6
ODONATA	2		2		3	6
MEGALOPTERA					1	1
TRICHOPTERA	2	3	5	2	4	10
LEPIDOPTERA		1	1			2
COLEOPTERA	3	1	2	1	1	5
DIPTERA TOTAL	28	24	25	19	25	50
DIPTERA:Ceratopogonidae	3	4	2	5	3	9
DIPTERA:Chironomidae	25	19	23	14	22	40
Subfam.-Tanypodinae	5	4	5	1	5	6
Subfam.-Prodiamesinae				1		1
Subfam.-Orthocladiinae	6	6	5	4	5	9
Subfam.-Chironominae	14	9	13	8	12	24
Tribe-Chironomini	11	6	9	6	9	19
Tribe-Tanytarsini	3	3	4	2	3	5
DIPTERA:Misc.		1				1
GASTROPODA		1				1
PELECYPODA		2	1	1		2
TOTAL SPECIES	44	41	45	34	44	94

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
TURBELLARIA		1				1
NEMATODA	1	1	1	1	2	6
OLIGOCHAETA	16	8	10	32	11	77
HIRUDINEA	0	0	3	1	0	4
AMPHIPODA	79	38	35	19	15	186
DECAPODA	0	0	1	0	0	1
EPHEMEROPTERA	184	63	110	66	107	530
ODONATA	3	0	3	0	5	11
MEGALOPTERA	0	0	0	0	4	4
TRICHOPTERA	5	6	8	2	7	28
LEPIDOPTERA	0	1	5	0	0	6
COLEOPTERA	3	70	13	1	1	88
DIPTERA TOTAL	194	537	127	46	128	1032
DIPTERA:Ceratopogonidae	5	6	2	5	8	26
DIPTERA:Chironomidae	189	530	125	41	120	1005
Subfam.-Tanypodinae	57	8	24	1	28	118
Subfam.-Prodiamesinae	0	0	0	1	0	1
Subfam.-Orthocladiinae	55	175	40	23	33	326
Subfam.-Chironominae	77	347	61	16	59	560
Tribe-Chironomini	37	17	42	11	39	146
Tribe-Tanytarsini	40	330	19	5	20	414
DIPTERA:Misc.	0	1	0	0	0	1
GASTROPODA	0	6	0	0	0	6
PELECYPODA	0	93	1	4	0	98
TOTAL INDIVIDUALS	485	824	317	172	280	2078

CRADLE LAKE APRIL 29 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
OLIGOCHAETA			2	1	2	3
HIRUDINEA					1	1
AMPHIPODA	2	2	1	2	2	2
HYDRACARINA					1	1
COLLEMBOLA	1			1		1
EPHEMEROPTERA	2	2	4	3	5	5
ODONATA	1	3		1	2	5
HEMIPTERA	2	1	3	2	2	5
NEUROPTERA			1			1
TRICHOPTERA	3	3		3	11	12
COLEOPTERA			1	2	2	3
DIPTERA TOTAL	26	21	14	20	35	45
DIPTERA:Ceratopogonida	2	3	4	3	4	7
DIPTERA:Chironomidae	23	18	10	16	30	37
Subfam. Tanypodinae	3	3	3	4	5	5
Subfam. Orthocladiinae	5	2	1	2	5	9
Subfam. Chironominae	15	13	6	10	20	23
Tribe Chironomini	12	10	5	9	17	20
Tribe Tanytarsini	3	3	1	1	3	3
DIPTERA:Chaoboridae	1			1	1	1
GASTROPODA					1	1
PELECYPODA	1	1	1	1	2	2
TOTAL SPECIES	38	33	27	36	67	87

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
OLIGOCHAETA			8	2	6	16
HIRUDINEA					2	2
AMPHIPODA	46	20	6	34	270	376
HYDRACARINA					1	1
COLLEMBOLA	1		2			3
EPHEMEROPTERA	28	9	36	48	358	479
ODONATA	1	9		2	38	50
HEMIPTERA	4	2	6	5	4	21
NEUROPTERA			1			1
TRICHOPTERA	14	8		3	28	53
COLEOPTERA			1	4	8	13
DIPTERA TOTAL	491	377	26	151	317	1362
DIPTERA:Ceratopogonida	4	8	8	13	20	53
DIPTERA:Chironomidae	486	369	18	136	296	1305
Subfam. Tanypodinae	191	162	5	35	100	493
Subfam. Orthocladiinae	8	2	1	3	12	26
Subfam. Chironominae	287	205	12	98	184	786
Tribe Chironomini	210	150	10	72	138	580
Tribe Tanytarsini	77	55	2	26	46	206
DIPTERA:Chaoboridae	1			2	1	4
GASTROPODA					1	1
PELECYPODA	6	8	10	9	9	42
TOTAL INDIVIDUALS	591	433	96	258	1042	2420

CROSSON LAKE MAY 21 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
OLIGOCHAETA	1	2	2	2	1	3
HIRUDINEA		1	1	1	2	2
AMPHIPODA	1	1	2	2	2	2
HYDRACARINA	1		2		1	2
EPHEMEROPTERA	3	6	5	5	5	7
ODONATA	2	1	4	3	5	8
HEMIPTERA			1	2	1	3
MEGALOPTERA		1			1	2
TRICHOPTERA	1	2	2	4	5	9
LEPIDOPTERA		1	1			1
COLEOPTERA		3	1		2	4
DIPTERA TOTAL	13	12	22	10	25	46
DIPTERA:Ceratopogonida	1	1	5	1	2	5
DIPTERA:Chironomidae	12	11	17	9	21	39
Subfam. Tanypodinac	2	2	3	1	3	6
Subfam. Orthocladiinae	5	3	4	2	6	13
Subfam. Chironominae	5	6	10	6	12	20
Tribe Chironomini	2	5	10	6	9	16
Tribe Tanytarsini	3	1			3	4
DIPTERA:Tipulidae					2	2
PELECYPODA		1	1	1	1	1
TOTAL SPECIES	22	31	44	30	51	90

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
OLIGOCHAETA	2	13	11	5	10	41
HIRUDINEA		1	3	2	6	12
AMPHIPODA	2	53	15	7	20	97
HYDRACARINA	1		7		1	9
EPHEMEROPTERA	4	79	42	63	222	410
ODONATA	2	2	6	3	20	33
HEMIPTERA			1	3	1	5
MEGALOPTERA		3			1	4
TRICHOPTERA	1	3	3	5	6	18
LEPIDOPTERA		1	3			4
COLEOPTERA		6	1		10	17
DIPTERA TOTAL	23	31	66	33	74	227
DIPTERA:Ceratopogonida	1	1	17	1	2	22
DIPTERA:Chironomidae	22	30	49	32	70	203
Subfam. Tanypodinac	3	6	11	1	16	37
Subfam. Orthocladiinae	14	5	11	2	12	44
Subfam. Chironominae	5	19	27	29	42	122
Tribe Chironomini	2	17	27	29	33	108
Tribe Tanytarsini	3	2			9	14
DIPTERA:Tipulidae					2	2
PELECYPODA		1	1	1	11	14
TOTAL INDIVIDUALS	35	193	159	122	382	891

DELANO LAKE MAY 4 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
TURBELLARIA	1				1	1
NEMATODA	2		1	1		2
OLIGOCHAETA	4		1	4	3	8
HIRUDINEA	1	2				2
AMPHIPODA	2	2	1	2	1	2
HYDRACARINA	3	4	1	3	1	8
COLLEMBOLA	1					1
EPHEMEROPTERA	5	3	4	3	4	5
ODONATA	8	3	5	7	5	12
HEMIPTERA				3		3
TRICHOPTERA	5	2	3	10	7	17
COLEOPTERA	4	3	2	3	2	7
DIPTERA TOTAL	40	33	33	34	26	61
DIPTERA:Ceratopogonidae	2	1	4	5	2	8
DIPTERA:Chironomidae	37	30	29	28	24	50
Subfam.-Tanypodinae	7	5	5	6	3	8
Subfam.-Orthocladiinae	7	5	7	8	6	14
Subfam.-Chironominae	23	20	17	24	15	28
Tribe-Chironomini	18	16	13	19	10	23
Tribe-Tanytarsini	5	4	4	5	5	5
DIPTERA:Tabanidae		1				1
DIPTERA:Misc.	1	1		1		2
GASTROPODA	3	2	1	2	1	3
PELECYPODA	2			2	2	4
TOTAL SPECIES	81	54	52	74	53	136

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
TURBELLARIA	3				1	4
NEMATODA	2		1	1		4
OLIGOCHAETA	11		1	9	5	26
HIRUDINEA	1	4				5
AMPHIPODA	208	38	35	11	138	430
HYDRACARINA	13	10	6	18	2	49
COLLEMBOLA	1					1
EPHEMEROPTERA	104	46	77	255	98	580
ODONATA	37	6	13	17	32	105
HEMIPTERA				5		5
TRICHOPTERA	8	2	3	37	14	64
COLEOPTERA	49	17	31	33	9	139
DIPTERA TOTAL	384	161	189	490	252	1476
DIPTERA:Ceratopogonidae	3	1	9	13	2	28
DIPTERA:Chironomidae	380	158	180	476	250	1444
Subfam.-Tanypodinae	160	33	50	136	135	514
Subfam.-Orthocladiinae	60	12	29	58	28	187
Subfam.-Chironominae	160	113	101	282	87	743
Tribe-Chironomini	90	86	63	221	48	508
Tribe-Tanytarsini	70	27	38	61	39	235
DIPTERA:Tabanidae		1				1
DIPTERA:Misc.	1	1		1		3
GASTROPODA	9	4	1	21	3	38
PELECYPODA	4			5	4	13
TOTAL INDIVIDUALS	834	288	357	902	558	2939

HAMER LAKE APRIL 18 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA				2		2
OLIGOCHAETA	1	1	1	2	1	2
AMPHIPODA	2	2	2	2	2	2
HYDRACARINA	2	2		2	1	4
EPHEMEROPTERA	3	3	4	3	2	4
ODONATA	5	6	9	5	2	11
HEMIPTERA	4		2	3		7
MEGALOPTERA	1	1	1		1	1
TRICHOPTERA	6	5	7	8	6	13
COLEOPTERA	2	1			1	4
DIPTERA TOTAL	20	20	25	25	30	52
DIPTERA:Ceratopogonidae	3	3	4	3	6	8
DIPTERA:Chironomidae	17	16	19	21	23	40
Subfam.–Tanypodinae	3	3	4	2	5	6
Subfam.–Orthocladiinae	3	2	7	6	4	10
Subfam.–Chironominae	11	11	8	13	14	24
Tribe–Chironomini	10	9	8	12	12	21
Tribe–Tanytarsini	1	2		1	2	3
DIPTERA:Tabanidae			1			1
DIPTERA:Tipulidae		1	1	1		2
DIPTERA:Misc.					1	1
PELECYPODA	1	1	1	1	1	1
TOTAL SPECIES	47	42	52	53	47	103

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA				2		2
OLIGOCHAETA	1	1	15	11	1	29
AMPHIPODA	4	8	39	13	95	159
HYDRACARINA	4	8		2	1	15
EPHEMEROPTERA	129	29	348	115	93	714
ODONATA	30	13	28	24	4	99
HEMIPTERA	7		2	3		12
MEGALOPTERA	3	2	11		19	35
TRICHOPTERA	10	11	27	55	27	130
COLEOPTERA	2	1			1	4
DIPTERA TOTAL	111	147	112	409	236	1015
DIPTERA:Ceratopogonidae	21	41	10	33	49	154
DIPTERA:Chironomidae	90	103	97	375	186	851
Subfam.–Tanypodinae	35	36	43	117	70	301
Subfam.–Orthocladiinae	33	22	38	130	58	281
Subfam.–Chironominae	22	45	16	128	58	269
Tribe–Chironomini	21	43	16	106	49	235
Tribe–Tanytarsini	1	2		22	9	34
DIPTERA:Tabanidae			1			1
DIPTERA:Tipulidae		3	4	1		8
DIPTERA:Misc.					1	1
PELECYPODA	4	12	30	33	6	85
TOTAL INDIVIDUALS	305	232	612	667	483	2299

HARP LAKE APRIL 25 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA	2	1			1	3
OLIGOCHAETA	4	5	2	3	3	7
HIRUDINEA		1		1		1
AMPHIPODA	1	2	1	2	1	2
HYDRACARINA	2	1		2	1	4
EPHEMEROPTERA	5	2	2	3	5	5
ODONATA	6	2	2	3	3	6
PLECOPTERA		1		1	1	1
HEMIPTERA	1	1			1	3
MEGALOPTERA					1	1
TRICHOPTERA	3	3	3	6	5	14
LEPIDOPTERA					1	1
COLEOPTERA	3	1	2	3	1	4
DIPTERA TOTAL	20	16	11	16	28	49
DIPTERA:Ceratopogonidae	4	6	3	5	6	12
DIPTERA:Chironomidae	16	8	8	8	18	30
Subfam.-Podonominae					1	1
Subfam.-Tanypodinae	7	3	4	4	4	8
Subfam.-Prodiamesinae					1	1
Subfam.-Orthocladiinae	9	5	4	4	12	20
Subfam.-Chironominae	19	8	8	12	10	26
Tribe-Chironomini	15	7	6	8	7	20
Tribe-Tanytarsini	4	1	2	4	3	6
DIPTERA:Tipulidae		1		2	4	5
DIPTERA:Misc.		1		1		2
GASTROPODA	3	1	1	2	1	4
PELECYPODA	3	5	2	1	2	5
TOTAL SPECIES	53	42	26	43	55	110

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA	2	1			1	4
OLIGOCHAETA	32	16	4	8	21	81
HIRUDINEA		1		2		3
AMPHIPODA	140	47	88	30	55	360
HYDRACARINA	11	1		2	10	24
EPHEMEROPTERA	94	30	18	48	52	242
ODONATA	37	9	5	30	6	87
PLECOPTERA		1		1	2	4
HEMIPTERA	1	1			4	6
MEGALOPTERA					1	1
TRICHOPTERA	4	8	3	9	5	29
LEPIDOPTERA					1	1
COLEOPTERA	7	2	4	11	1	25
DIPTERA TOTAL	510	126	105	162	136	1039
DIPTERA:Ceratopogonidae	20	23	13	24	29	109
DIPTERA:Chironomidae	490	101	92	135	99	917
Subfam.-Podonominae					4	4
Subfam.-Tanypodinae	209	47	68	97	40	461
Subfam.-Prodiamesinae					3	3
Subfam.-Orthocladiinae	109	20	11	12	32	184
Subfam.-Chironominae	172	34	13	26	20	265
Tribe-Chironomini	158	33	7	20	14	232
Tribe-Tanytarsini	14	1	6	6	6	33
DIPTERA:Tipulidae		1		2	8	11
DIPTERA:Misc.		1		1		2
GASTROPODA	12	15	2	4	1	34
PELECYPODA	19	15	7	14	13	68
TOTAL INDIVIDUALS	869	273	236	321	309	2008

PINCHER LAKE MAY 5 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA	1					1
OLIGOCHAETA	2	1	2	2	2	4
HIRUDINAE	1		1	1	4	4
AMPHIPODA	2	2	2	1	2	2
COLLEMBOLA		1				1
EPHEMEROPTERA	2	2	2	2	2	2
ODONATA	4	2	4	3	3	6
HEMIPTERA	2	1	1	1	1	2
MEGALOPTERA	1					1
TRICHOPTERA	8	6	7	6	6	14
LEPIDOPTERA		1				1
COLEOPTERA	3		2	1	1	3
DIPTERA TOTAL	32	28	34	26	24	51
DIPTERA:Ceratopogonidae	4	3	4	3	2	6
DIPTERA:Chironomidae	27	25	30	22	21	42
Subfam.–Tanypodinae	4	4	4	4	4	6
Subfam.–Orthocladiinae	7	5	8	3	5	12
Subfam.–Chironominae	16	16	18	15	12	24
Tribe–Chironomini	10	13	13	11	9	18
Tribe–Tanytarsini	6	3	5	4	3	6
DIPTERA:Tabanidae				1		1
DIPTERA:Misc.	1				1	2
PELECYPODA	1	1	1	1	1	1
TOTAL SPECIES	59	45	56	44	46	93

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA	2					2
OLIGOCHAETA	24	5	12	7	10	58
HIRUDINAE	3		1	1	4	9
AMPHIPODA	54	66	36	12	139	307
COLLEMBOLA		1				1
EPHEMEROPTERA	67	56	117	129	180	549
ODONATA	4	4	7	11	7	33
HEMIPTERA	5	1	1	6	2	15
MEGALOPTERA	1					1
TRICHOPTERA	40	10	18	18	11	97
LEPIDOPTERA		1				1
COLEOPTERA	9		8	1	1	19
DIPTERA TOTAL	614	627	340	246	138	1965
DIPTERA:Ceratopogonidae	14	26	19	15	12	86
DIPTERA:Chironomidae	599	601	321	230	117	1868
Subfam.–Tanypodinae	82	157	43	77	13	372
Subfam.–Orthocladiinae	24	23	33	33	25	138
Subfam.–Chironominae	493	421	245	120	79	1358
Tribe–Chironomini	161	248	117	78	38	642
Tribe–Tanytarsini	332	173	128	42	41	716
DIPTERA:Tabanidae				1		1
DIPTERA:Misc.	1				9	10
PELECYPODA	46	13	1	9	11	80
TOTAL INDIVIDUALS	869	784	541	440	503	3137

PLASTIC LAKE APRIL 26 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
OLIGOCHAETA	3	2	1	2	1	5
HIRUDINEA		1		1		2
AMPHIPODA	3	2	1	2	1	3
COLLEMBOLA			1			1
EPHEMEROPTERA	2	3	3	2	2	3
ODONATA	3	3	2	2	2	7
PLECOPTERA					1	1
HEMIPTERA				3	1	4
MEGALOPTERA				1	1	1
TRICHOPTERA	3	8	3	2	2	12
LEPIDOPTERA			1	1	1	2
COLEOPTERA			2	1	2	4
DIPTERA TOTAL	33	25	20	41	31	72
DIPTERA:Ceratopogonidae	5	4	4	8	8	17
DIPTERA:Chironomidae	26	19	16	31	18	47
Subfam.–Podonominae					1	1
Subfam.–Tanypodinae	5	5	4	6	3	8
Subfam.–Orthocladiinae	10	5	5	9	9	18
Subfam.–Chironominae	11	9	7	16	5	20
Tribe–Chironomini	9	7	4	13	4	16
Tribe–Tanytarsini	2	2	3	3	1	4
DIPTERA:Tipulidae	2				1	3
DIPTERA:Misc.		1		2	3	4
DIPTERA–indet./terrestrial forms		1			1	1
GASTROPODA		1				1
PELECYPODA	3	3	2	4	1	5
TOTAL SPECIES	50	48	36	62	46	123

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
OLIGOCHAETA	19	8	2	19	9	57
HIRUDINEA		2		1		3
AMPHIPODA	31	11	1	52	4	99
COLLEMBOLA			1			1
EPHEMEROPTERA	31	14	10	31	3	89
ODONATA	6	3	2	8	2	21
PLECOPTERA					9	9
HEMIPTERA				3	1	4
MEGALOPTERA				4	1	5
TRICHOPTERA	7	11	5	3	3	29
LEPIDOPTERA			6	1	1	8
COLEOPTERA			2	1	3	6
DIPTERA TOTAL	221	112	87	136	110	666
DIPTERA:Ceratopogonidae	24	9	4	17	23	77
DIPTERA:Chironomidae	192	99	83	114	65	553
Subfam.–Podonominae					2	2
Subfam.–Tanypodinae	34	26	19	34	6	119
Subfam.–Orthocladiinae	104	16	28	49	50	247
Subfam.–Chironominae	54	57	36	31	7	185
Tribe–Chironomini	26	48	26	20	4	124
Tribe–Tanytarsini	28	9	10	11	3	61
DIPTERA:Tipulidae	5				9	14
DIPTERA:Misc.		3		5	10	18
DIPTERA–indet./terrestrial forms		1			3	4
GASTROPODA		1				1
PELECYPODA	13	11	6	36	3	69
TOTAL INDIVIDUALS	328	173	122	295	149	1067

SKIDWAY LAKE APRIL 20 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE 1	2	3	4	5	TOTAL
OLIGOCHAETA	1	1	1	1	1	1
HIRUDINEA		1				1
ISOPODA		1	1		1	1
AMPHIPODA	2	1	1	1	1	2
HYDRACARINA		1	1		1	1
EPHEMEROPTERA	2	3	3	3	3	3
ODONATA	7	7	9	7	1	11
HEMIPTERA			1	2	3	5
MEGALOPTERA	1	1	1	1	2	2
TRICHOPTERA	5	6	7	5	5	9
COLEOPTERA	2		2			2
DIPTERA TOTAL	27	26	26	30	20	44
DIPTERA:Ceratopogonidae	2	3	3	3	3	6
DIPTERA:Chironomidae	25	23	23	25	17	36
Subfam.–Tanypodinae	4	4	5	6	4	6
Subfam.–Orthocladiinae	8	3	4	4	2	8
Subfam.–Chironominae	13	16	14	15	11	22
Tribe–Chironomini	11	15	12	13	10	20
Tribe–Tanytarsini	2	1	2	2	1	2
DIPTERA:Tabanidae				1		1
DIPTERA:Misc.				1		1
PELECYPODA		1	1			1
TOTAL SPECIES	47	49	54	50	38	83

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE 1	2	3	4	5	TOTAL
OLIGOCHAETA	3	9	1	4	1	18
HIRUDINEA		2				2
ISOPODA		21	3		13	37
AMPHIPODA	42	24	14	39	86	205
HYDRACARINA		1	1		2	4
EPHEMEROPTERA	138	46	83	108	53	428
ODONATA	10	26	20	26	1	83
HEMIPTERA			1	3	3	7
MEGALOPTERA	1	5	8	8	5	27
TRICHOPTERA	19	17	23	15	13	87
COLEOPTERA	4		3			7
DIPTERA TOTAL	184	327	239	272	91	1113
DIPTERA:Ceratopogonidae	17	9	18	33	14	91
DIPTERA:Chironomidae	167	318	221	237	77	1020
Subfam.–Tanypodinae	52	15	50	43	9	169
Subfam.–Orthocladiinae	28	16	75	19	11	149
Subfam.–Chironominae	87	287	96	175	57	702
Tribe–Chironomini	82	263	68	155	42	610
Tribe–Tanytarsini	5	24	28	20	15	92
DIPTERA:Tabanidae				1		1
DIPTERA:Misc.				1		1
PELECYPODA		18	17			35
TOTAL INDIVIDUALS	401	496	413	475	268	2053

WESTWARD LAKE MAY 3 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA			1		1	1
OLIGOCHAETA	1	1	3	1	2	3
HIRUDINEA	3	1			1	4
AMPHIPODA	2	2	2	2	2	2
DECAPODA	1					1
HYDRACARINA	1		1			2
COLLEMBOLA			1			1
EPHEMEROPTERA	4	6	4	6	3	6
ODONATA	1		1		2	3
HEMIPTERA		1	1	2		2
TRICHOPTERA	1	3	6	1		7
LEPIDOPTERA			1		2	3
COLEOPTERA	4	3	2	1	1	5
DIPTERA TOTAL	22	19	34	16	22	50
DIPTERA:Ceratopogonidae	3	1	3	1	3	8
DIPTERA:Chironomidae	19	17	29	15	16	38
Subfam.–Tanypodinae	4	2	4	3	4	5
Subfam.–Prodiamesinae				1	1	1
Subfam.–Orthocladiinae	3	5	8	3	4	10
Subfam.–Chironominae	12	10	17	8	7	22
Tribe–Chironomini	7	6	13	5	4	17
Tribe–Tanytarsini	5	4	4	3	3	5
DIPTERA:Misc.		1	1		2	3
DIPTERA–indet./terrestrial forms			1		1	1
GASTROPODA			1		1	1
PELECYPODA	3	2	2	1	3	4
TOTAL SPECIES	43	38	60	30	40	95

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
NEMATODA			1		1	2
OLIGOCHAETA	1	5	7	5	16	34
HIRUDINEA	3	1			1	5
AMPHIPODA	40	292	110	102	106	650
DECAPODA	1					1
HYDRACARINA	1		1			2
COLLEMBOLA			1			1
EPHEMEROPTERA	85	180	98	96	22	481
ODONATA	1		1		3	5
HEMIPTERA		1	1	2		4
TRICHOPTERA	1	5	19	1		26
LEPIDOPTERA			1		2	3
COLEOPTERA	12	13	9	1	1	36
DIPTERA TOTAL	86	46	218	39	116	505
DIPTERA:Ceratopogonidae	4	2	5	1	41	53
DIPTERA:Chironomidae	82	42	212	38	73	447
Subfam.–Tanypodinae	36	3	62	13	12	126
Subfam.–Prodiamesinae				2	2	4
Subfam.–Orthocladiinae	5	10	14	5	8	42
Subfam.–Chironominae	41	29	136	18	51	275
Tribe–Chironomini	23	14	65	14	7	123
Tribe–Tanytarsini	18	15	71	4	44	152
DIPTERA:Misc.		1	1		2	4
DIPTERA–indet./terrestrial forms		1				1
GASTROPODA			1		1	2
PELECYPODA	20	22	5	8	89	144
TOTAL INDIVIDUALS	251	565	473	254	358	1901

YOUNG LAKE APRIL 22 1988

NUMBER OF SPECIES

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
OLIGOCHAETA	3		1	3		5
AMPHIPODA	1	1	1	2	2	2
DECAPODA					1	1
HYDRACARINA	1			1		2
EPHEMEROPTERA	4	5	4	5	5	7
ODONATA	2			4	4	4
PLECOPTERA	1					1
MEGALOPTERA	1					1
TRICHOPTERA	9		2	8	2	14
COLEOPTERA	2	3	1	1	3	7
DIPTERA TOTAL	42	16	13	23	16	57
DIPTERA:Ceratopogonidae	6		1	2	1	7
DIPTERA:Chironomidae	33	16	12	21	15	47
Subfam.–Tanypodinae	6	3	3	5	3	7
Subfam.–Prodiamesinae	1					1
Subfam.–Orthocladiinae	12	9	6	7	5	19
Subfam.–Chironominae	14	4	3	9	7	20
Tribe–Chironomini	10	2	3	6	5	15
Tribe–Tanytarsini	4	2		3	2	5
DIPTERA:Misc.	3					3
GASTROPODA	2	1	1	2		3
PELECYPODA	1	1	1	2	1	4
TOTAL SPECIES	69	27	24	51	34	108

NUMBER OF INDIVIDUALS

TAXONOMIC NAME	SITE					TOTAL
	1	2	3	4	5	
OLIGOCHAETA	26		2	3		31
AMPHIPODA	34	49	77	218	61	439
DECAPODA					1	1
HYDRACARINA	1			1		2
EPHEMEROPTERA	73	36	19	46	56	230
ODONATA	6			26	8	40
PLECOPTERA	15					15
MEGALOPTERA	4					4
TRICHOPTERA	18		2	10	5	35
COLEOPTERA	2	4	1	5	13	25
DIPTERA TOTAL	229	34	45	289	60	657
DIPTERA:Ceratopogonidae	22		5	7	2	36
DIPTERA:Chironomidae	203	34	40	282	58	617
Subfam.–Tanypodinae	93	9	5	124	18	249
Subfam.–Prodiamesinae	1					1
Subfam.–Orthocladiinae	52	20	31	51	33	187
Subfam.–Chironominae	57	5	4	107	7	180
Tribe–Chironomini	48	2	4	17	5	76
Tribe–Tanytarsini	9	3		90	2	104
DIPTERA:Misc.	4					4
GASTROPODA	4	1	2	14		21
PELECYPODA	4	1	2	4	1	12
TOTAL INDIVIDUALS	416	125	150	616	205	1512

APPENDIX 7

MID-LAKE AND LITTORAL ZONE WATER CHEMISTRY COMPARISON FOR THE SPRING SURVEY

Parameter	Abbreviation	Description
Alkalinity (mg ·L^{-1})	alkti	Total inflection point alkalinity alkalinity
Alkalinity (mg ·L^{-1})	alkt	Total fixed point alkalinity to pH 4.5
Alkalinity (mg ·L^{-1})	alkt3	Total fixed point alkalinity to pH 3.8
Aluminum (μg ·L^{-1})	alut	Total Aluminum
Calcium (mg ·L^{-1})	caur	Calcium
Chloride (mg ·L^{-1})	clidur	Chloride
Conductivity (μS)	cond25	Conductivity at 25 °C
Dissolved Inorganic Carbon (mg ·L^{-1})	DIC	Dissolved Inorganic Carbon
Dissolved Organic Carbon (mg ·L^{-1})		DOC Dissolved Organic Carbon
Iron (μg ·L^{-1})	Fe	Total Iron
Potassium (mg ·L^{-1})	K	Total Potassium
Magnesium (mg ·L^{-1})	Mg	Magnesium
Manganese (μg ·L^{-1})	MN	Manganese
Sodium (mg)	NA	Sodium
Ammonium (μg ·L^{-1})	NH$_4$	Ammonium
Nitrate-Nitrite (μg ·L^{-1})	NO$_3$	Nitrate-Nitrite
Total Kjeldahl Nitrogen (μg ·L^{-1})	TKN	Total Kjeldahl Nitrogen
pH	pH	pH
Sulphate (mg ·L^{-1})	SO$_4$	Sulphate as SO$_4$
Total Phosphorus (μg)	TP	Total Phosphorus as P

BLUE CHALK LAKE 09 MAY 1988

CHEMISTRY PARAMETER	MID	LITTORAL BENTHIC SITES								
	LAKE	1	2	3	4	5	AVG	STD	U95	L95
ALKTI(GRAN)	4.22	4.13	4.17	4.01	4.1	4.02	4.09	0.06	4.16	-5.10
ALKT(TFE)	6.07	5.96	6.05	5.89	5.88	5.92	5.94	0.06	6.02	-7.41
Al	2	0	4	0	0	1	1	2	3	-2
Ca	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	2.5	-3.1
Cl	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.0	0.4	-0.4
COND25	27.8	28.4	28.4	28.2	28.2	28.5	28.3	0.1	28.5	-35.2
DIC	1.32	1.33	1.3	1.3	1.26	1.29	1.30	0.02	1.32	-1.62
DOC	1.5	1.4	1.4	1.3	1.4	1.5	1.4	0.1	1.5	-1.8
Fe	29	32	29	33	34	27	31	3	34	-40
K	0.36	0.37	0.4	0.36	0.36	0.36	0.37	0.02	0.39	-0.47
Mg	0.84	0.84	0.84	0.84	0.84	0.84	0.84			
Mn	18	18	18	16	17	17	17	1	18	-22
Na	0.8	0.74	0.78	0.76	0.8	0.8	0.78	0.02	0.80	-0.98
NH4	25	27	28	28	28	29	28	1	29	-35
NO3	62	63	66	62	65	66	64	2	66	-81
TKN	210	240	200	220	230	220	222	13	238	-283
pH	6.76	6.74	6.76	6.71	6.76	6.73	6.74	0.02	6.76	-8.38
SO4	6.4	6.4	6.5	6.4	6.4	6.5	6.4	0.0	6.5	-8.0
TP	5.3	5.6	4.8	5.9	5.7	5.0	5.4	0.4	5.9	-6.9

CLEAR LAKE 28 APR 1988

	MID	LITTORAL BENTHIC SITES								
	LAKE	1	2	3	4	5	AVG	STD	U95	L95
ALKTI(GRAN)	0.39	0.45	0.33	0.37	0	0.26	0.28	0.15	0.47	0.09
ALKT(TFE)	2.42	2.49	2.34	2.37	1.97	2.14	2.26	0.18	2.49	2.03
Al	27	77	20	19	18	19	31	23	59	2
Ca	2.2	2.1	2.2	2.1	2.2	2.2	2.2	0.0	2.2	2.1
Cl	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.0	0.4	0.4
COND25	25.8	25.9	25.7	25.5	26.9	25.7	25.9	0.5	26.6	25.3
DIC	0.66	0.68	0.67	0.67	0.72	0.56	0.66	0.05	0.73	0.59
DOC	1.5	1.5	1.4	1.3	1.7	1.4	1.5	0.1	1.6	1.3
Fe	44	48	50	58	44	45	49	5	55	43
K	0.34	0.34	0.34	0.34	0.36	0.33	0.34	0.01	0.35	0.33
Mg	0.58	0.60	0.58	0.60	0.62	0.58	0.60	0.01	0.61	0.58
Mn	63	64	62	63	77	62	66	6	73	58
Na	0.46	0.48	0.48	0.48	0.52	0.48	0.49	0.02	0.51	0.47
NH4	33	37	35	34	27	35	34	3	38	29
NO3	55	55	56	55	52	65	57	4	62	51
TKN	160	160	140	140	160	150	150	9	161	139
pH	5.74	5.78	5.78	5.81	5.44	5.67	5.70	0.14	5.87	5.53
SO4	8.0	8.1	8.2	8.1	8.5	8.0	8.2	0.2	8.4	8.0
TP	4.6	5.6	4.8	3.8	4.1	4.9	4.6	0.6	5.4	3.8

CRADLE LAKE 29 APR 1988

CHEMISTRY PARAMETER	MID	LITTORAL BENTHIC SITES								
	LAKE	1	2	3	4	5	AVG	STD	U95	L95
ALKTI(GRAN)	0.47	0.47	0.38	0.4	0.37	0.41	0.41	0.03	0.45	0.36
ALKT(TFE)	2.22	2.27	2.24	2.25	2.16	2.17	2.22	0.04	2.27	2.16
Al	13	15	16	17	15	15	16	1	17	15
Ca	1.8	1.8	1.8	1.8	1.8	1.8	1.8			
Cl	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2
COND25	25.0	22.5	22.5	22.4	22.0	21.9	22.3	0.3	22.6	21.9
DIC	0.67	0.69	0.75	0.68	0.66	0.66	0.69	0.03	0.73	0.65
DOC	1.2	1.3	1.3	1.2	1.2	1.2	1.2	0.0	1.3	1.2
Fe	45	55	58	46	99	52	62	19	85	39
K	0.25	0.26	0.27	0.24	0.24	0.22	0.25	0.02	0.27	0.22
Mg	0.52	0.54	0.56	0.54	0.54	0.54	0.54	0.01	0.55	0.53
Mn	34	36	36	35	37	37	36	1	37	35
Na	0.44	0.46	0.46	0.44	0.44	0.44	0.45	0.01	0.46	0.44
NH4	39	40	39	40	43	38	40	2	42	38
NO3	47	49	49	48	50	50	49	1	50	48
TKN	170	220	210	180	190	180	196	16	216	176
pH	5.66	5.66	5.63	5.65	5.64	5.65	5.65	0.01	5.66	5.63
SO4	6.6	6.6	6.6	6.6	6.6	6.6	6.6	0.0	6.6	6.5
TP	5.2	7.9	8.8	5.0	6.7	6.1	6.9	1.3	8.5	5.2

CROSSON LAKE 21 MAY 1988

	MID	LITTORAL BENTHIC SITES								
	LAKE	1	2	3	4	5	AVG	STD	U95	L95
ALKTI(GRAN)	0.45	0.4	0.42	0.27	0.53	0.47	0.42	0.09	0.53	0.31
ALKT(TFE)	2.36	2.29	2.4	2.13	2.4	2.37	2.32	0.10	2.44	2.19
Al	65	59	57	80	57	57	62	9	73	51
Ca	2.3	2.3	2.3	2.5	2.4	2.3	2.4	0.1	2.5	2.3
Cl	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.0	0.5	0.4
COND25	25.4	25.9	25.9	29.0	25.8	25.8	26.5	1.3	28.0	24.9
DIC	0.75	0.82	0.66	0.62	0.75	0.69	0.71	0.07	0.80	0.62
DOC	3.9	3.9	4.0	6.0	3.8	3.8	4.3	0.9	5.4	3.2
Fe	330	350	340	360	340	330	344	10	357	331
K	0.29	0.28	0.28	0.28	0.29	0.28	0.28	0.00	0.29	0.28
Mg	0.74	0.78	0.78	0.86	0.78	0.76	0.79	0.03	0.84	0.75
Mn	34	35	34	34	35	36	35	1	36	34
Na	0.66	0.64	0.66	0.74	0.68	0.66	0.68	0.03	0.72	0.63
NH4	19	18	17	33	18	15	20	6	28	12
NO3	172	170	174	141	167	173	165	12	180	150
TKN	350	260	270	580	340	290	348	119	496	200
pH	5.55	5.52	5.51	5.28	5.55	5.59	5.49	0.11	5.62	5.36
SO4	7.1	7.3	7.2	8.0	7.1	7.2	7.4	0.3	7.8	6.9
TP	14.0	12.2	13.8	21.5	12.3	13.7	14.7	3.5	19.0	10.3

DELANO LAKE 04 MAY 1988

CHEMISTRY PARAMETER	MID LAKE	LITTORAL BENTHIC SITES					AVG	STD	U95	L95
		1	2	3	4	5				
ALKTI(GRAN)	2.32	2.27	2.27	2.33	2.21	2.29	2.27	0.04	2.32	2.23
ALKTI(TFE)	4.25	4.06	4.03	4.16	4.07	4.18	4.10	0.06	4.17	4.03
Al	54	52	50	48	53	52	51	2	53	49
Ca	2.6	2.5	2.6	2.5	2.5	2.5	2.5	0.0	2.6	2.5
Cl	0.3	0.3	0.3	0.3	0.3	0.3	0.3	ERR	ERR	ERR
COND25	29.4	29.7	29.8	29.8	29.8	29.8	29.8	0.0	29.8	29.7
DIC	1.24	1.23	1.15	1.19	1.23	1.19	1.20	0.03	1.24	1.16
DOC	4.3	4.3	5.0	4.4	4.4	4.3	4.5	0.3	4.8	4.2
Fe	200	190	190	180	180	230	194	19	217	171
K	0.41	0.40	0.40	0.40	0.40	0.39	0.40	0.00	0.40	0.39
Mg	1.02	1.04	1.00	1.00	1.00	1.00	1.01	0.02	1.03	0.99
Mn	49	48	47	47	42	48	46	2	49	44
Na	0.82	0.78	0.76	0.78	0.78	0.76	0.77	0.01	0.78	0.76
NH4	15	7	6	7	9	4	7	2	9	5
NO3	170	168	168	168	157	165	165	4	170	160
TKN	290	260	250	240	260	280	258	13	274	242
pH	6.12	6.10	6.12	6.13	6.10	6.13	6.12	0.01	6.13	6.10
SO4	7.6	7.6	7.6	7.6	7.6	7.6	7.6	0.0	7.6	7.6
TP	9.1	8.4	7.9	7.5	10.6	9.9	8.8	1.2	10.3	7.4

HAMER LAKE 18 APR 1988

	MID LAKE	LITTORAL BENTHIC SITES					AVG	STD	U95	L95
		1	2	3	4	5				
ALKTI(GRAN)	0.36	0.64	0.48	0.37	−0.11	0.80	0.44	0.31	0.82	0.05
ALKT(TFE)	2.12	2.31	2.27	2.05	1.63	2.55	2.16	0.31	2.55	1.78
Al	171	165	164	173	183	167	170	7	179	162
Ca	2.7	2.7	2.6	2.7	2.7	2.7	2.7	0.0	2.7	2.6
Cl	2.1	1.6	1.6	2.1	1.7	1.6	1.7	0.2	2.0	1.5
COND25	33.2	32.6	32.9	33.3	34.1	32.8	33.1	0.5	33.8	32.5
DIC	1.30	1.20	1.18	1.36	1.56	1.24	1.31	0.14	1.48	1.13
DOC	7.9	7.7	7.9	7.9	8.1	7.7	7.9	0.1	8.0	7.7
Fe	350	390	370	340	290	380	354	36	399	309
K	0.46	0.43	0.45	0.46	0.44	0.47	0.45	0.01	0.47	0.43
Mg	0.68	0.66	0.68	0.66	0.66	0.68	0.67	0.01	0.68	0.66
Mn	48	47	46	45	42	47	45	2	48	43
Na	0.76	0.76	0.76	0.76	0.76	0.76	0.76	ERR	ERR	ERR
NH4	55	50	51	52	42	57	50	5	56	44
NO3	112	120	120	119	104	130	119	8	129	108
TKN	460	430	410	410	410	460	424	20	448	400
pH	5.14	5.26	5.20	5.13	4.96	5.30	5.17	0.12	5.32	5.02
SO4	7.5	7.4	7.5	7.6	7.5	7.6	7.5	0.1	7.6	7.4
TP	11.0	11.9	12.1	12.2	11.9	12.1	12.0	0.1	12.2	11.9

HARP LAKE 25 APR 1988

CHEMISTRY PARAMETER	MID LAKE	LITTORAL BENTHIC SITES								
		1	2	3	4	5	AVG	STD	U95	L95
ALKTI(GRAN)	3.40	3.29	3.40	3.26	3.46	3.30	3.34	0.08	3.44	3.25
ALKT(TFE)	5.06	5.08	5.17	5.03	5.12	5.01	5.08	0.06	5.15	5.01
Al	27	33	27	26	24	28	28	3	31	24
Ca	3.0	2.9	2.9	2.9	3.0	2.9	2.9	0.0	3.0	2.9
Cl	1.1	1.2	1.2	1.2	1.2	1.2	1.2			
COND25	33.4	33.2	33.7	33.7	33.6	33.4	33.5	0.2	33.8	33.3
DIC	1.47	1.35	1.49	1.42	1.34	1.32	1.38	0.06	1.46	1.31
DOC	3.3	3.6	3.4	3.3	3.4	3.5	3.4	0.1	3.6	3.3
Fe	100	100	100	100	98	94	98	2	101	96
K	0.53	0.50	0.52	0.51	0.54	0.51	0.52	0.01	0.53	0.50
Mg	1.08	1.08	1.10	1.10	1.10	1.08	1.09	0.01	1.10	1.08
Mn	26	26	27	27	26	24	26	1	27	25
Na	1.24	1.26	1.30	1.30	1.34	1.30	1.30	0.03	1.33	1.27
NH4	3	8	9	3	8	6	7	2	9	4
NO3	160	148	162	161	168	154	159	7	167	150
TKN	210	210	200	220	260	220	222	20	247	197
pH	6.30	6.31	6.24	6.25	6.32	6.29	6.28	0.03	6.32	6.24
SO4	7.5	7.5	7.4	7.5	7.4	7.4	7.4	0.0	7.5	7.3
TP	7.7	7.5	7.4	8.3	8.8	7.1	7.8	0.6	8.5	7.0

PINCHER LAKE 05 MAY 1988

CHEMISTRY PARAMETER	MID LAKE	LITTORAL BENTHIC SITES								
		1	2	3	4	5	AVG	STD	U95	L95
ALKTI(GRAN)	-0.05	-0.10	-0.02	-0.05	0.00	0.48	0.06	0.21	0.32	-0.20
ALKT(TFE)	1.83	1.85	1.89	1.85	1.90	2.19	1.94	0.13	2.10	1.78
Al	77	86	85	79	82	79	82	3	86	79
Ca	1.6	1.6	1.6	1.6	1.5	1.5	1.6	0.0	1.6	1.5
Cl	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.0	0.3	0.2
COND25	22.1	22.3	22.1	22.1	22.1	22.0	22.1	0.1	22.2	22.0
DIC	0.52	0.51	0.51	0.48	0.48	0.48	0.49	0.01	0.51	0.47
DOC	1.8	1.9	1.8	1.9	1.9	1.8	1.9	0.0	1.9	1.8
Fe	78	80	74	78	88	79	80	5	85	74
K	0.33	0.33	0.33	0.33	0.32	0.33	0.33	0.00	0.33	0.32
Mg	0.48	0.48	0.50	0.50	0.50	0.50	0.50	0.01	0.51	0.49
Mn	54	55	53	54	54	56	54	1	56	53
Na	0.52	0.54	0.50	0.50	0.50	0.48	0.50	0.02	0.53	0.48
NH4	55	56	54	56	54	56	55	1	56	54
NO3	118	111	113	117	115	116	114	2	117	112
TKN	220	260	230	230	260	230	242	15	260	224
pH	5.39	5.38	5.37	5.38	5.40	5.45	5.40	0.03	5.43	5.36
SO4	6.5	6.7	6.7	6.5	6.6	6.6	6.6	0.1	6.7	6.5
TP	5.9	5.6	4.5	4.1	5.3	3.8	4.7	0.7	5.5	3.8

PLASTIC LAKE 26 APR 1988

CHEMISTRY PARAMETER	MID LAKE	LITTORAL BENTHIC SITES					AVG	STD	U95	L95
		1	2	3	4	5				
ALKTI(GRAN)	0.60	0.43	0.32	0.17	0.31	0.15	0.28	0.10	0.40	0.15
ALKT(TFE)	2.40	2.28	2.18	2.27	2.25	2.02	2.20	0.10	2.32	2.08
Al	33	31	29	32	30	50	34	8	44	25
Ca	2.0	2.0	2.1	2.0	2.0	2.0	2.0	0.0	2.1	2.0
Cl	0.4	0.6	0.4	0.4	0.4	0.3	0.4	0.1	0.5	0.3
COND25		23.7	22.3	22.6	22.4	23.0	22.8	0.5	23.4	22.2
DIC	0.85	0.70	0.74	0.76	0.80	0.73	0.75	0.03	0.79	0.70
DOC	2.0	2.2	1.9	1.8	1.9	2.3	2.0	0.2	2.3	1.8
Fe	115	140	110	130	190	120	138	28	173	103
K	0.19	0.28	0.21	0.19	0.19	0.18	0.21	0.04	0.26	0.16
Mg	0.54	0.66	0.58	0.58	0.56	0.56	0.59	0.04	0.63	0.54
Mn	38	36	36	36	38	40	37	2	39	35
Na	0.50	0.68	0.50	0.52	0.50	0.54	0.55	0.07	0.63	0.46
NH4	53	59	60	54	50	48	54	5	60	48
NO3	71	87	75	75	73	70	76	6	83	69
TKN	215	300	220	190	220	230	232	37	277	187
pH	5.64	5.64	5.61	5.63	5.59	5.44	5.58	0.07	5.67	5.49
SO4	6.5	6.7	6.5	6.5	6.6	6.8	6.6	0.1	6.7	6.5
TP	5.5	5.3	6.0	9.8	7.3	6.3	6.9	1.6	8.8	5.0

SKIDWAY LAKE 20 APR 1988

CHEMISTRY PARAMETER	MID LAKE	LITTORAL BENTHIC SITES					AVG	STD	U95	L95
		1	2	3	4	5				
ALKTI(GRAN)	0.24	0.28	0.37	0.29	0.26	0.27	0.29	0.04	0.34	0.25
ALKT(TFE)	2.11	2.10	2.22	2.15	2.07	2.16	2.14	0.05	2.20	2.08
Al	108	105	109	112	114	112	110	3	114	107
Ca	1.5	1.4	1.4	1.4	1.4	1.4	1.4			
Cl	1.1	0.5	1.1	0.5	0.5	1.1	0.7	0.3	1.1	0.4
COND25	21.8	21.5	22.0	21.6	21.6	21.5	21.6	0.2	21.9	21.4
DIC	1.51	1.62	1.62	1.62	1.57	1.56	1.60	0.03	1.63	1.56
DOC	2.9	2.8	2.9	2.9	3.0	3.1	2.9	0.1	3.1	2.8
Fe	320	320	310	320	320	300	314	8	324	304
K	0.33	0.32	0.34	0.33	0.32	0.32	0.33	0.01	0.34	0.32
Mg	0.46	0.48	0.50	0.48	0.48	0.46	0.48	0.01	0.50	0.46
Mn	140	140	140	140	140	130	138	4	143	133
Na	0.62	0.60	0.64	0.60	0.60	0.60	0.61	0.02	0.63	0.59
NH4	102	100	101	100	103	98	100	2	102	98
NO3	79	80	83	79	80	79	80	1	82	78
TKN	370	350	370	330	330	340	344	15	363	325
pH	5.26	5.26	5.31	5.25	5.26	5.29	5.27	0.02	5.30	5.25
SO4	5.8	5.8	5.8	5.8	5.8	5.8	5.8	0.0	5.8	5.7
TP	11.8	7.9	9.5	6.4	9.4	6.0	7.8	1.4	9.6	6.0

WESTWARD LAKE 03 MAY 1988

CHEMISTRY PARAMETER	MID LAKE	LITTORAL BENTHIC SITES					AVG	STD	U95	L95
		1	2	3	4	5				
ALKTI(GRAN)	2.07	2.06	1.93	1.98	2.04	2.01	2.00	0.05	2.06	1.95
ALKT(TFE)	3.41	3.86	3.79	3.74	3.92	3.77	3.82	0.07	3.90	3.73
Al	7	12	12	11	9	9	11	1	12	9
Ca	2.1	2.1	2.2	2.1	2.2	2.1	2.1	0.0	2.2	2.1
Cl	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2
COND25	23.9	24.2	24.4	24.3	24.2	24.2	24.3	0.1	24.4	24.2
DIC	1.18	1.27	1.27	1.24	1.21	1.15	1.23	0.04	1.28	1.17
DOC	1.3	2.1	1.4	1.4	1.3	2.2	1.7	0.4	2.2	1.2
Fe	49	46	75	42	47	53	53	12	67	38
K	0.35	0.36	0.36	0.35	0.34	0.35	0.35	0.01	0.36	0.34
Mg	0.68	0.68	0.68	0.70	0.70	0.68	0.69	0.01	0.70	0.68
Mn	61	57	56	52	56	59	56	2	59	53
Na	0.54	0.54	0.56	0.54	0.56	0.56	0.55	0.01	0.56	0.54
NH4	33	31	36	28	31	31	31	3	35	28
NO3	107	103	120	108	107	102	108	6	116	100
TKN	190	180	190	170	160	200	180	14	198	162
pH	6.06	6.29	6.14	6.14	6.21	6.17	6.19	0.06	6.26	6.12
SO4	6.4	6.4	6.3	6.3	6.3	6.4	6.3	0.0	6.4	6.3
TP	4.0	4.0	6.4	4.7	4.7	4.8	4.9	0.8	5.9	3.9

YOUNG LAKE 22 APR 1988

	MID LAKE	LITTORAL BENTHIC SITES					AVG	STD	U95	L95
		1	2	3	4	5				
ALKTI(GRAN)	4.45	4.42	4.28	4.86	4.47	4.42	4.49	0.20	4.73	4.25
ALKT(TFE)	6.26	6.21	6.14	6.73	6.27	6.23	6.32	0.21	6.58	6.05
Al	9	8	9	21	12	9	12	5	18	6
Ca	3.0	3.0	3.0	3.1	3.0	3.0	3.0	0.0	3.1	3.0
Cl	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.0	0.4	0.3
COND25	31.1	30.3	30.7	31.7	30.8	30.9	30.9	0.5	31.4	30.3
DIC	1.58	1.70	1.64	1.64	1.61	1.62	1.64	0.03	1.68	1.60
DOC	3.0	2.9	2.9	2.7	2.8	2.9	2.8	0.1	2.9	2.7
Fe	87	110	90	110	84	76	94	14	111	77
K	0.56	0.55	0.55	0.54	0.56	0.55	0.55	0.01	0.56	0.54
Mg	0.96	0.96	0.96	1.02	0.96	0.96	0.97	0.02	1.00	0.94
Mn	50	49	49	47	45	40	46	3	50	42
Na	1.04	1.02	1.02	1.14	1.08	1.02	1.06	0.05	1.12	1.00
NH4	9	9	8	12	8	14	10	2	13	7
NO3	192	195	189	178	191	195	190	6	197	182
TKN	200	250	240	220	230	230	234	10	247	221
pH	6.47	6.46	6.47	6.61	6.54	6.51	6.52	0.05	6.59	6.45
SO4	6.8	6.7	6.7	6.8	6.6	6.6	6.7	0.1	6.8	6.6
TP	9.5	10.2	9.5	2.1	10.1	9.9	8.3	3.1	12.2	4.4

APPENDIX 1

LRTAP RATIONALE AND SAMPLING PROTOCOLS

As part of the overall biological effects monitoring program, the periodic survey of lake benthos is intended to give a reliable estimate of community structure for the common, but sensitive, benthic and semi-benthic macroinvertebrates and to determine the response through time of these communities to changing environmental conditions. The emphasis has been placed on sampling three major groups: Ephemeroptera, Trichoptera and Crustacea, partly due to the established sensitivity of these groups to a variety of contaminants and partly because these groups are important links in the food chain, are widely represented across the country and easily sampled by a variety of techniques.

Four principal sampling activities are used to characterize the benthic fauna of each lake. First, representative segments of shoreline and the adjacent shallow littoral areas are sampled with sweep nets and by hand to collect Ephemeroptera, Trichoptera, Odonata, Amphipoda, Gastropoda and other miscellaneous shallow water forms. Second, dredge samples are taken from the deeper portions of the lake to collect Amphipoda, Mollusca and Insecta from the sub-littoral. Third, baited wire traps, set out overnight, are used to capture Decapoda and Hirudinea. And fourth, taxa such as *Mysis* or *Chaoborus*, which are benthic during the day, but planktonic at night, are captured by a series of night time, vertical net tows.

The methods presented here have been tested at the Experimental Lakes Area, northwestern Ontario and are thought to be generally applicable to most lacustrine habitats. Following an initial year of testing and evaluation, revisions or additions to the protocol may be necessary

Lake Selection

The "lake benthos" portion of the protocol is based on the assumption that lakes have been selected for their general usefulness in biomonitoring, according to the criteria agreed upon at the May, 1986 Winnipeg Workshop.

Survey Timing

It is difficult to base the characterization of any habitat on the presence or absence of the early life stages of most benthic invertebrates. Young are difficult to collect because they often choose refuges that are hard to sample effectively. Relative to the adult forms, young are small, fragile and often escape all but the finest mesh samplers, or are damaged beyond recognition. In addition, young are often morphologically different from the adults and generally of little use to the taxonomists. To ensure maximum benefit from the work, therefore, it is important that the benthic surveys be conducted at a time of year when the maximum number of species are present in the adult form or late larval stages.

For crustacean invertebrates, this time is in the spring or early summer. For the Trichoptera, Ephemeroptera and Odonata, adult insect emergence usually begins within a month or two after ice-out and continues throughout the summer, depending on the species present. While the taxonomy of insects is primarily based on the adults, the latter three groups are more easily sampled in their aquatic forms as larvae or nymphs and in most cases are taxonomically distinct enough to provide genus or species level identifications. Larval identifications of the Chironomidae or the Chaoboridae are more difficult without associates adult material. However, the period of chironomid emergence is protracted, due to the variety of species present in most habitats, so only a few adult forms could be sampled during a "one short" survey. Adult Diptera should, therefore, be overlooked and preference given to larval sampling. As with the other groups, the best time to do this is in the spring, prior to the major period of adult insect emergence. The resultant loss of taxonomic information for the chironomids and chaoborids is probably not critical since these insects generally appear to be more resistant to various forms of pollution than other benthic taxa.

Mollusks and leeches can be effectively sampled at any time of the year but, in the case of decapoda crustaceans, there are some advantages to sampling either in the spring or late fall. Crayfish overwinter in the intermoult stage and females lay eggs in the spring, so at this time of year, collections can be used to evaluate the maximum degree of exoskeleton hardening and breeding success. By late fall young-of-the-year crayfish can be captured (though sometimes with difficulty) to determine recruitment success.

Although the optimum time of year to sample each system will ultimately depend upon a consideration of the various life histories of its fauna, it seems that, as a general rule, it is best to sample in the spring.

Sampling Methods

a) Optimizing Sampling Effort

The sampling protocol outlined below is intended to be used as a guideline. The methodologies have been chosen for their general usefulness, but they are quite specific in their detail. Although it is recognized that they may not be universally applicable, each of the methods should be tried.

The lack of a precise definition of the amount of sampling effort required to yield a representative sample of the fauna in each habitat, is one area of critical weakness in the protocol. This is particularly true of the section on shoreline and shallow littoral sampling, where sampling effort has been defined as the amount of time spent performing each sampling activity. The shoreline and shallow water areas of most lakes are the most productive and diverse habitats and often the most difficult to sample effectively. This area also contains the greatest number of sensitive species, largely because the animals are exposed to the highest fluxes of pollutants entering the lake. It is important, therefore, to take great care when choosing the sampling sites and to obtain some measure of sampling efficiency.

Gear type, physical conditions of the area and the skill of individual workers are all factors which will affect collecting efficiency. Two procedures are recommended for the first year of sampling (and periodically thereafter) to maximize the specimen return and minimize sampling effort:

i) An experienced biologist should make the decisions about where to sample and how it should be done (assuming that modifications to standard procedures are necessary). The biologist should oversee the sampling operation, train assistants and eventually ensure program continuity from year to year.

ii) Using, as a guideline, the sampling times suggested in the "shore sampling" section of the protocol, the biologist should make three separate sets of collections at each site, then subsequently determine an optimum sampling strategy. This optimum should be taken as the sampling time necessary to obtain more than 90% of the maximum number of species found at any location. Similarly, the number of dredge and net tow samples required should also be evaluated.

b) Shore and Shallow Littoral Collections

i) Purpose

Many important indicator species occupy the shallow littoral habitat. Principally, one should expect to collect representatives of the Ephemeroptera, Trichoptera, Odonata, Decapoda, Amphipoda, Diptera and Coleoptera. The goal is to sample as many different areas as possible but, at the same time, avoid collecting large volumes of the vegetation, mud, allochthonous material, rocks and gravel that characterize this habitat. In addition, it is important to minimize habitat destruction during the sampling process.

ii) Site Selection and Documentation

Five shoreline sampling sites should be chosen for each lake. These locations should include both average and extreme habitat types, but should be chosen with a view to a representative characterization of the lake. Preference should be given to areas which afford good cover or great physical, within-site diversity. It is desirable that sites be chosen on both the windward and leeward shores. Areas within the immediate influence of inflowing rivers or streams should be avoided, unless there is some overriding reason to include them, because the faunal composition of these regions is more likely to reflect the characteristics of the inflow than those of the lake.

Site locations should be plotted on a lake map. Each site should then be described in writing and photographed to provide a record for future comparison. thus, any change in the species assemblage at a location can be correlated with long term changes in habitat condition. This baseline record is also useful for monitoring any habitat destruction which may occur as a result of the sampling activities.

Local conditions of wind speed and direction, air and water temperature, water level, cloud cover, precipitation, etc. should also be noted at the time of sampling.

iii) Sampling Procedures

Sweep net samples are to be taken from the complete range of habitat type in the 0-1 m depth range. With care, the amount of extraneous substrate collected by this method can be minimized. This is desirable because it not only simplifies the task of sorting out the specimens, but also reduces damage to the habitat. During the collecting period the net should be emptied frequently to prevent clogging and loss of specimens. **Suggested sampling time: 10 minutes.**

As the final phase of the shoreline sampling, the field worker should spend time making hand collections of invertebrates by turning over rocks, inspecting debris and examining other hard to sample habitats. This is often the most effective way of sampling Trichoptera, Ephemeroptera, Mollusca and other sessile or burrowing animals. Specimens (other than leeches) should be preserved as they are collected. Note that leeches contract when preserved, thereby obscuring their taxonomically useful features. To prevent this problem it is usually easiest to identify the material live or to narcotize specimens with carbon dioxide (Alka Seltzer tablets, dilute soft drinks, soda water or beer) prior to preserving them. **Suggested sampling time: 15 minutes.**

iv) Secondary Sample Processing and Specimen Identification

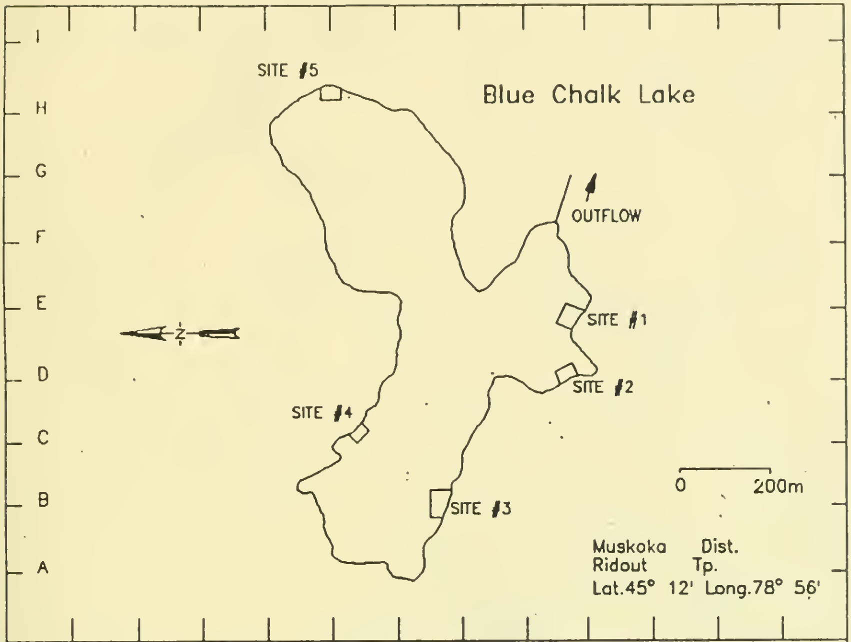
Once the specimens have been brought back to the laboratory they are fixed with Kahle's fluid for two days. The preservative should then be changed to 70% Ethanol to prevent specimens from becoming bleached or embrittled.

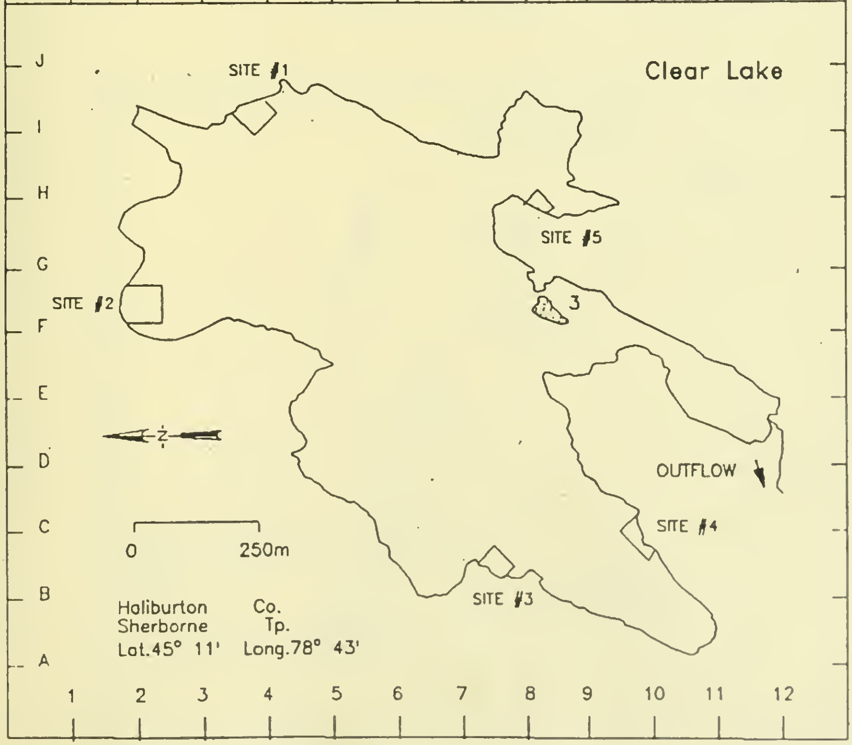
To facilitate sorting, unprocessed, preserved samples may be stained with Rose Bengal solution (a vital stain that colours animal tissues pink) just prior to examining them in the laboratory.

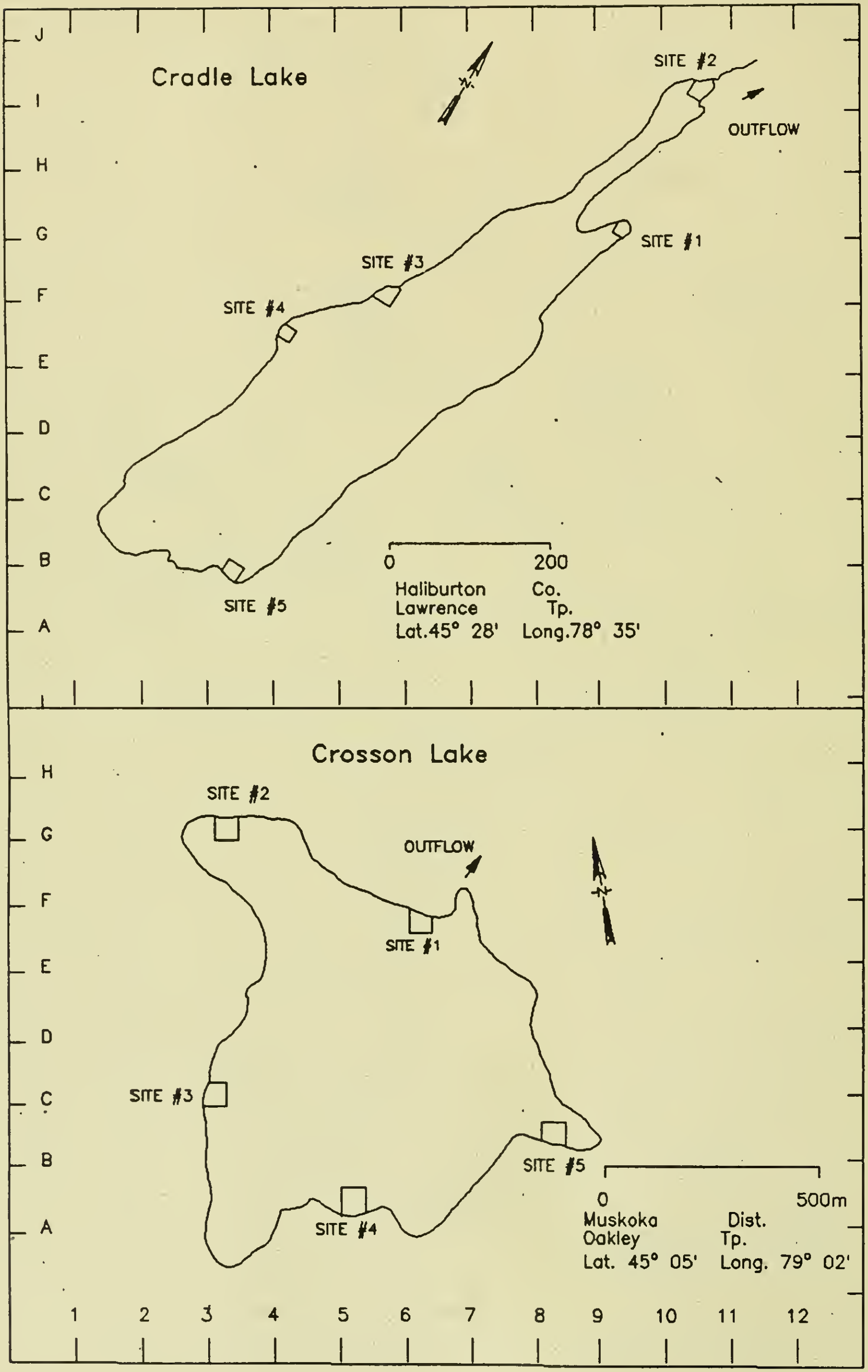
Specimens should be identified to the species level (where possible) according to the taxonomic keys given in the references listed in Appendix 2, or with the aid of taxonomic experts. Type specimens of all taxa should be archived for future reference.

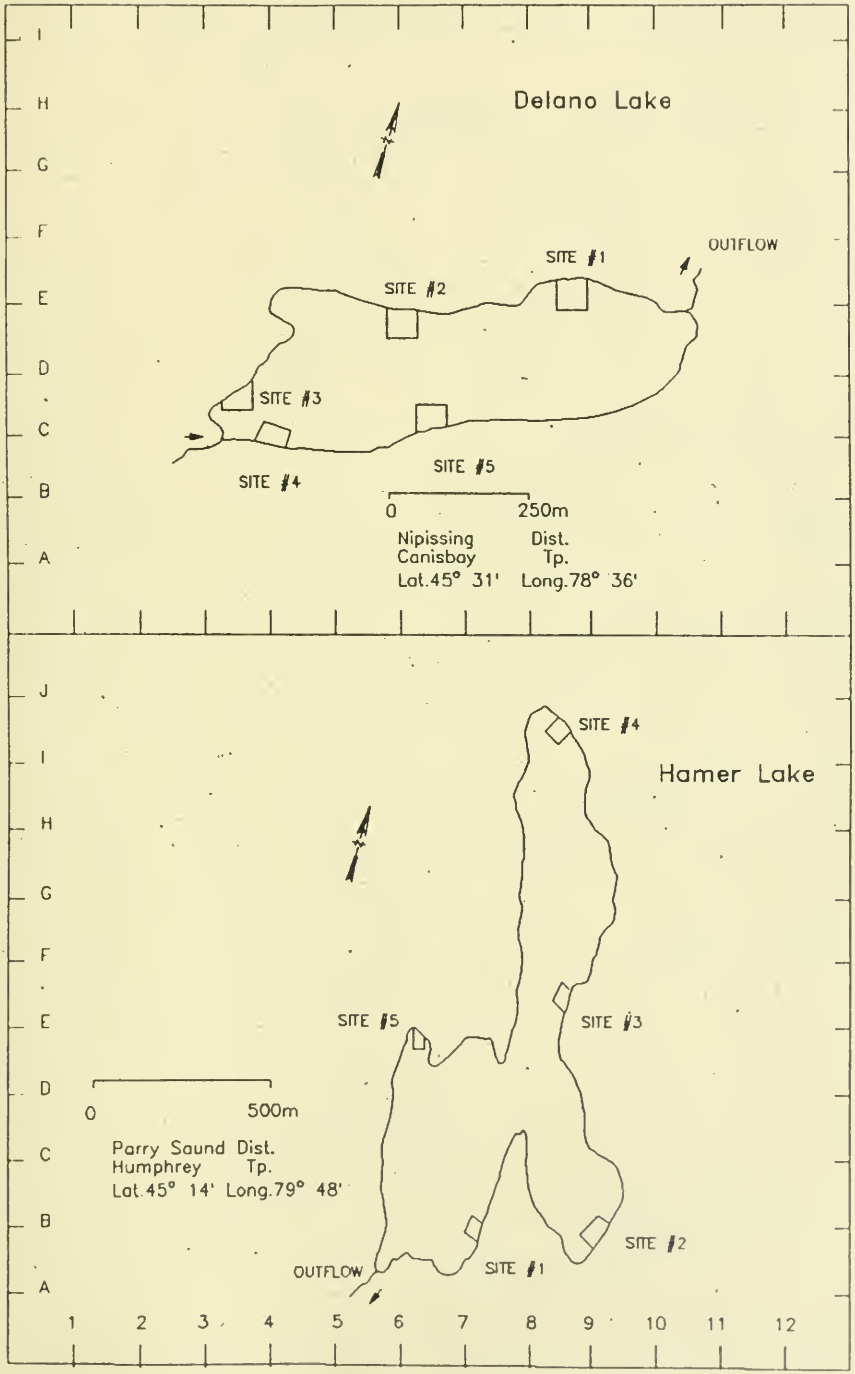
APPENDIX 2

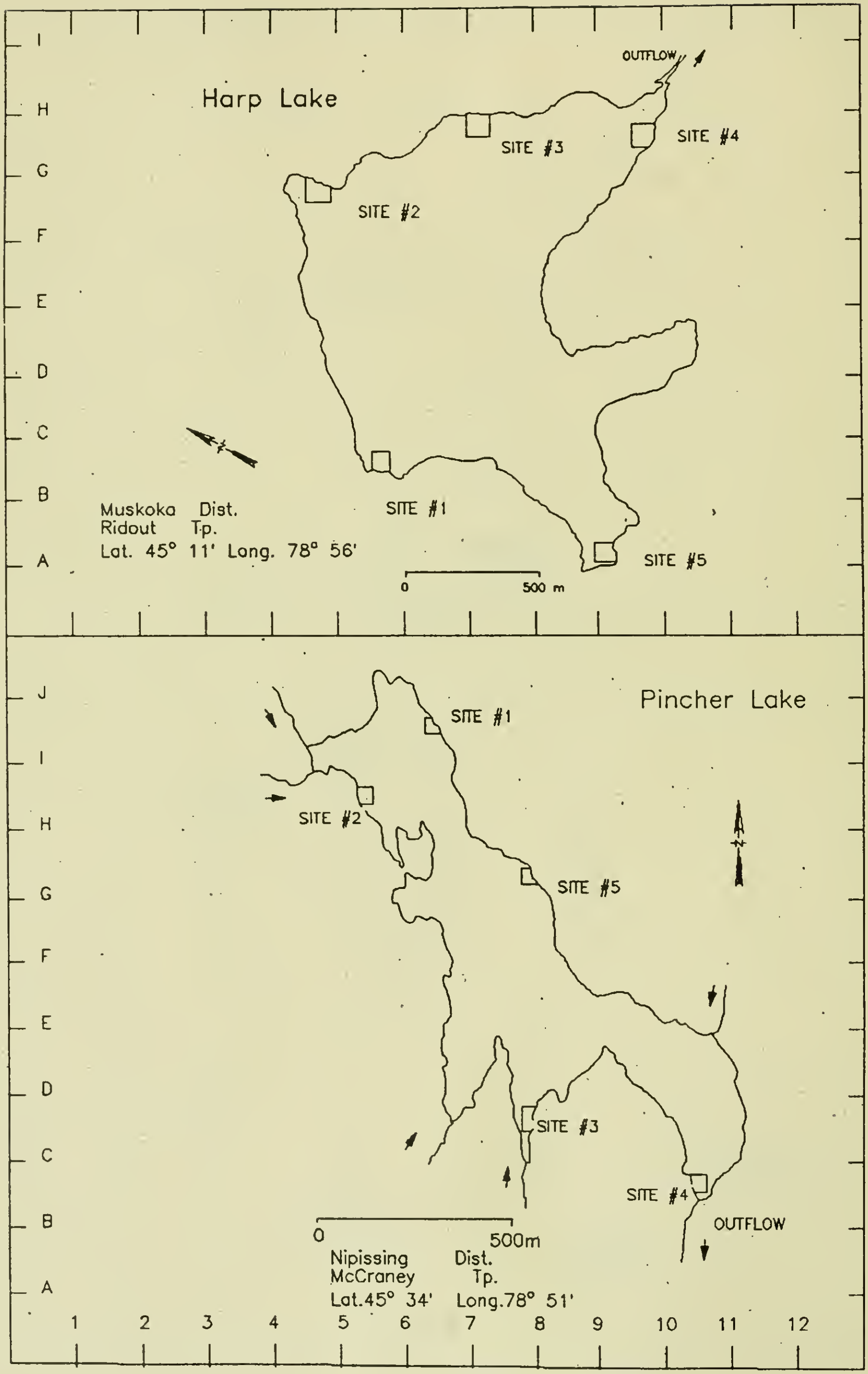
MAPS OF THE STUDY LAKES

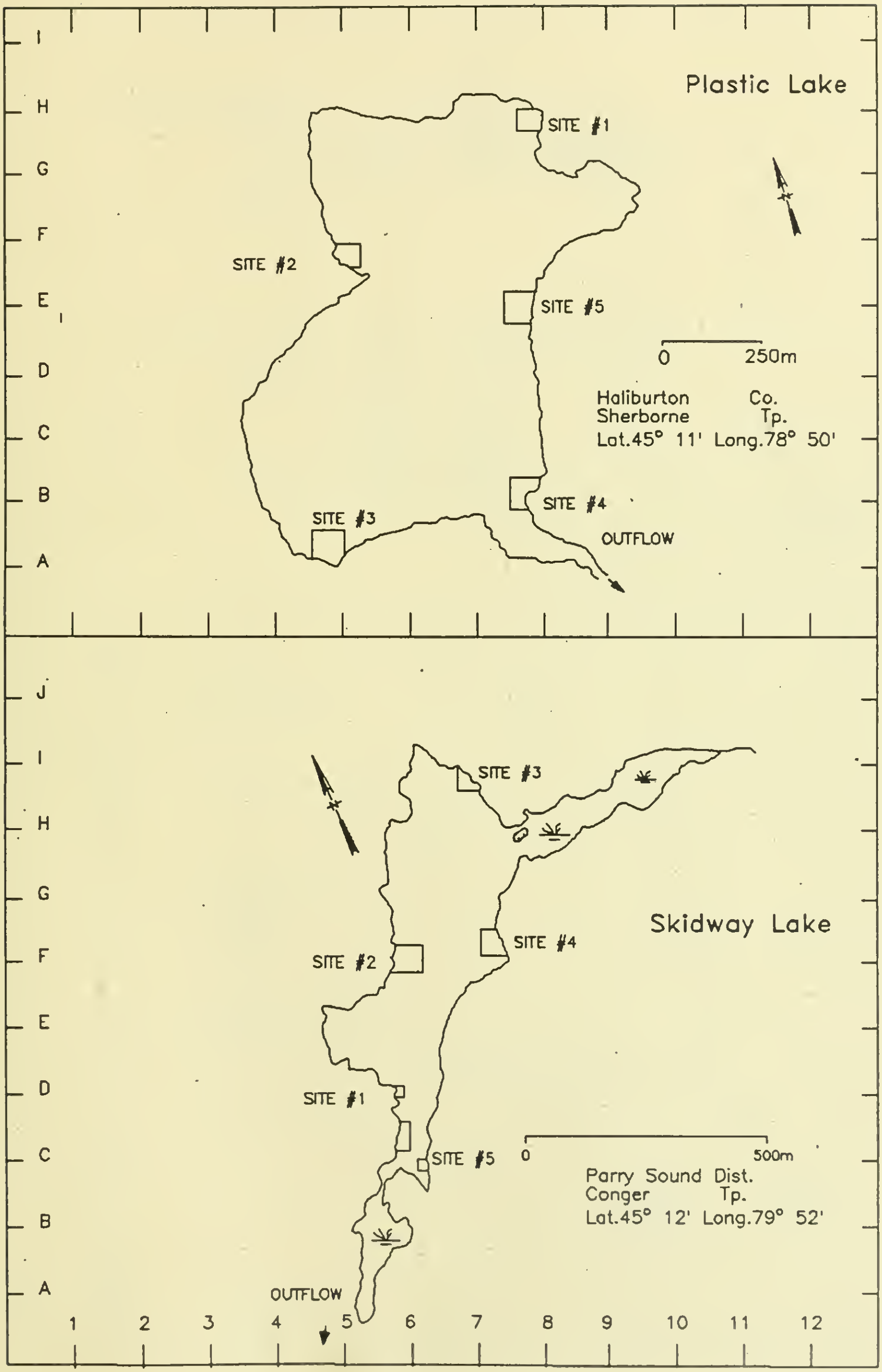

Blue Chalk Lake
SITE #5
OUTFLOW
SITE #1
SITE #2
SITE #4
SITE #3
N
0 200m
Muskoka Dist.
Ridout Tp.
Lat.45° 12' Long.78° 56'
I
H
G
F
E
D
C
B
A

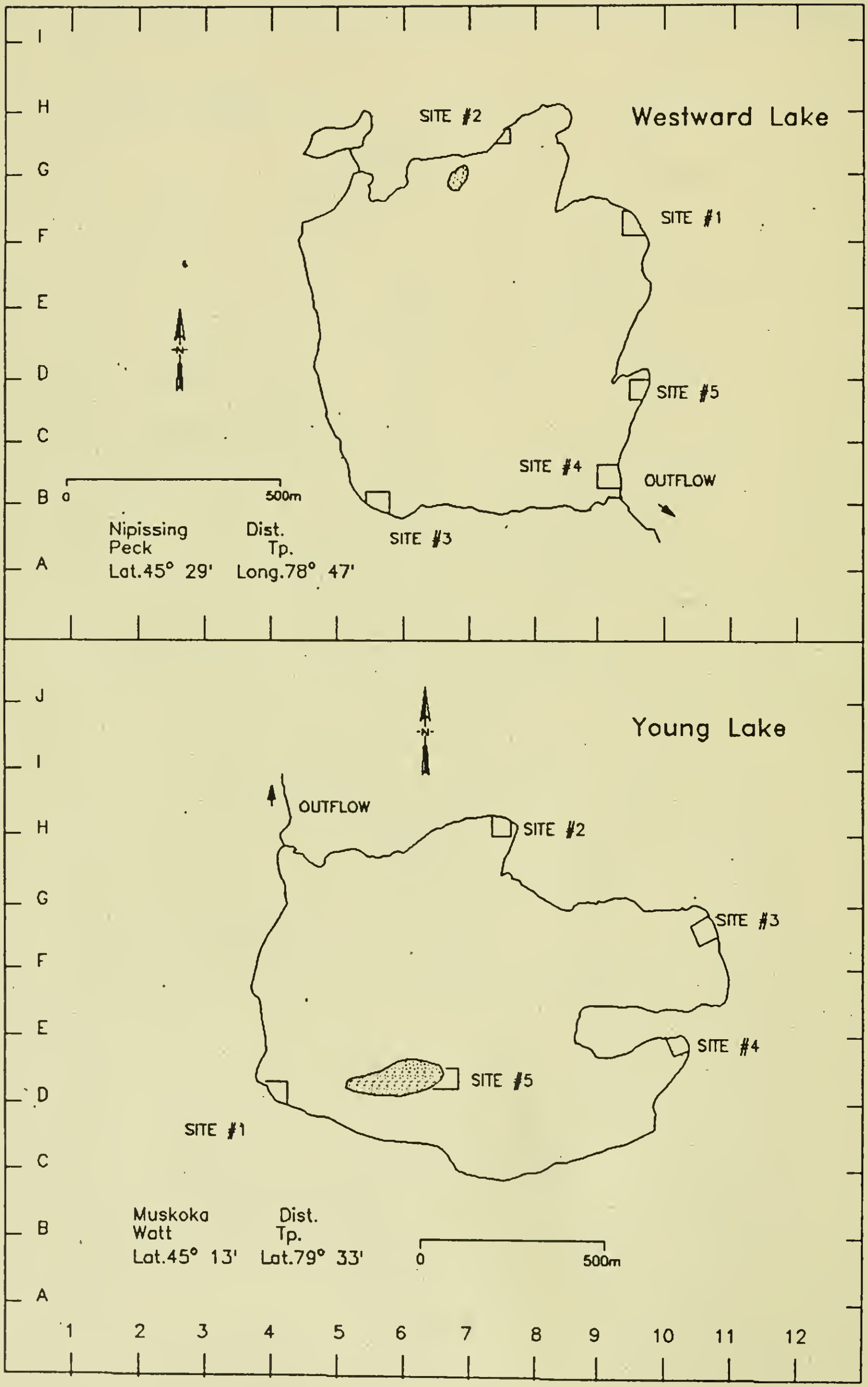

Clear Lake
SITE #1
SITE #5
SITE #2
3
N
OUTFLOW
SITE #4
SITE #3
0 250m
Haliburton Co.
Sherborne Tp.
Lat.45° 11' Long.78° 43'
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12


Cradle Lake
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
OUTFLOW
N
0
200
Haliburton Co.
Lawrence Tp.
Lat.45° 28' Long.78° 35'
J
I
H
G
F
E
D
C
B
A
Crosson Lake
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
OUTFLOW
N
0
500m
Muskoka Dist.
Oakley Tp.
Lat. 45° 05' Long. 79° 02'
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12


Delano Lake
OUTFLOW
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
0
250m
Nipissing Dist.
Canisbay Tp.
Lat.45° 31' Long.78° 36'
Hamer Lake
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
OUTFLOW
0
500m
Parry Sound Dist.
Humphrey Tp.
Lat.45° 14' Long.79° 48'
A
B
C
D
E
F
G
H
I
J
1
2
3
4
5
6
7
8
9
10
11
12


Harp Lake
OUTFLOW
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
Muskoka Dist.
Ridout Tp.
Lat. 45° 11' Long. 78° 56'
0
500 m
A
B
C
D
E
F
G
H
I
Pincher Lake
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
OUTFLOW
0
500m
Nipissing Dist.
McCraney Tp.
Lat.45° 34' Long.78° 51'
A
B
C
D
E
F
G
H
I
J
1
2
3
4
5
6
7
8
9
10
11
12


Plastic Lake
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
OUTFLOW
0
250m
Haliburton Co.
Sherborne Tp.
Lat.45° 11' Long.78° 50'
Skidway Lake
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
OUTFLOW
0
500m
Parry Sound Dist.
Conger Tp.
Lat.45° 12' Long.79° 52'
A
B
C
D
E
F
G
H
I
J
1
2
3
4
5
6
7
8
9
10
11
12


Westward Lake
SITE #1
SITE #2
SITE #3
SITE #4
SITE #5
OUTFLOW
0
500m
Nipissing Dist.
Peck Tp.
Lat.45° 29' Long.78° 47'
I
H
G
F
E
D
C
B
A
Young Lake
OUTFLOW
SITE #2
SITE #3
SITE #4
SITE #5
SITE #1
Muskoka Dist.
Watt Tp.
Lat.45° 13' Lat.79° 33'
0
500m
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12

APPENDIX 3

LAKE INVENTORY DATA SUMMARIES WITH SAMPLING SITE DESCRIPTIONS

Substrate types:
LOS - highly organic floculent
CSD - coarse sand
SLT - silt
COB - cobble
PEB - pebbles
BON - boulders
BDR - bedrock

BLUE CHALK

Drainage System	Black River drainage watershed (2EC15). The outflow enters Red Chalk Lake which flows southward into the Pairo Lakes. The Pairo Lakes then flow to a creek enroute to the Black River which eventually reaches Lake Simcoe.
Geology	Minor till plain is the major surficial deposit (on average) at Blue Chalk, and the bedrock type is granitized biotite gneiss.
Crayfish Species	*Cambarus bartoni, Orconectes propinquus* and *Orconectes virilis* (Reid and David 1990).
Stresses	
Acidification:	The lake is rated as moderately sensitive to acid loading (Alkalinity = 84.2 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 6.0 m) and the chemical parameter total phosphorus (ice-free mean value = 5.65 $\mu eq \cdot L^{-1}$) indicate that Blue Chalk Lake is oligotrophic.
Site #1 CSD COB	shoreline - t-brush, logs, birch, white pine, cedar and spruce trees. substrate - sand (50% of the site), rocks (40%), macro Eriocaulon coverage (5%) and 5% sticks.
Site #2 LOS	shoreline - logs, t-brush, birch and white pine trees. substrate - detritus (70%) and 30% logs/sticks.
Site #3 LOS	shoreline - t-brush, cedar, birch, white pine and balsam fir trees. substrate - detritus (65% of the site) and 35% stick/logs.
Site #4 CSD PEB LOS	shoreline - t-brush, logs, cedar, birch, white pine, maple and balsam fir trees substrate - sand/PEB (45% of the site), detritus (40%), sticks/logs 10%) and 5% macros.
Site #5 CSD	shoreline - t-brush, logs, birch, cedar, white pine and maple trees. substrate - sand (75% of the site), macros (20%) and 5% logs/sticks.

CLEAR LAKE

Drainage System	Cameron Lake drainage watershed (2HF08). The outflow enters Big Hawk Lake which flows southward to Halls Lake. Halls Lake flows through Boshkung, Mountain and Horseshoe Lakes enroute to the Gull River which eventually reaches Lake Simcoe and then Georgian Bay in Lake Huron (Reid and Snyder 1986).
Geology	The surficial cover is dominated by thin till and rock ridges. The biotite gneiss is composed of metamorphosed beds of greywacke, arkose and sandstone (Reid and Snyder 1986). The bedrock type is biotite gneiss with traces of small marble interbeds.
Crayfish Species	*Cambarus bartoni* and *Orconectes propinquus*.
Stresses Acidification:	The lake is rated as extremely sensitive to acid loading (Alkalinity = 7.8 μeq $\cdot$L^{-1}).
Eutrophication:	Cultural eutrophication is not a stress in Clear Lake. Secchi depth measurements (mean value = 7.8 m) and the chemical parameter total phosphorus (ice-free mean value = 3.8 μeq $\cdot$L^{-1}) indicate that Clear Lake is oligotrophic.
Site #1 CSD COB	shoreline - lab. tea, white pine and hemlock trees. substrate - sand (70% of the site) and 30% cobble.
Site #2 CSD COB	shoreline - bedrock, boulders, white pine and cedar trees. substrate - sand (70% of the site) and 30% rocks/cobble.
Site #3 CSD LOS	shoreline - lab. tea, white pine and cedar trees. substrate - sand (50% of the site), detritus (30%) and 20% macros.
Site #4 CSD COB	shoreline - lab. tea and cedar trees. substrate - sand (60% of the site), macros (30%) and 10% rock.
Site #5 LOS	shoreline - bedrock, lab. tea, white pine and hemlock trees. substrate - detritus (70% of the site), Eriocaulon (20%) and 10% logs.

CRADLE LAKE

Drainage System	Upper Madawaska River watershed (2KD18). The outflow is south into Bonnechere Lake which flows into Phipps Lake and then on through a series of lakes which eventually lead to the Upper Madawaska River and on to the Ottawa River.
Geology	The surficial cover of the watershed consist of (22.7% of the area) by sand and gravel, underlined with 44.6% of unsubdivided veneer. Bedrock knobs account for 0.4% of the watershed. The bedrock in this watershed consists of granite, gneiss, quartzose sandstone, syenitic and associated alkalic rocks (100% of the land area).
Crayfish Species	*Cambarus bartoni.*
Stresses Acidification:	The lake is rated as extremely sensitive to acid loading (Alkalinity = 9.4 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 7.7 m) and the chemical parameter total phosphorus (ice-free mean value = 6.2 $\mu eq \cdot L^{-1}$) indicate that Cradle Lake is oligotrophic.
Site #1 LOS CSD COB	shoreline - leather leaf, black spruce and tamarack trees. substrate - detritus (40% of the site), sand (35%), sticks & logs (20%) and 5% rocks.
Site #2 LOS	shoreline - leather leaf and tamarack trees. substrate - detritus (80% of the site) and 20% logs/sticks.
Site #3 COB PEB CSD LOS	shoreline - leather leaf. substrate - rock/stones (40% of the site), sand (30%), logs/sticks (25%) and 5% detritus.
Site #4 LOS	shoreline - black spruce, white pine, cedar and hemlock trees. substrate - detritus (80% of the site), and 20% logs/sticks.
Site #5 LOS	shoreline - "dead heads", cedar and hemlock trees. substrate - LOS (100% of the site).

CROSSON LAKE

Drainage System	Black River drainage watershed (2EC15). The outflow joins Clear Creek which flows southward into the Black River. The Black River then eventually reaches Lake Simcoe.
Geology	The surficial geology of Crosson Lake is composed of peat and ponded areas surrounded by expanses of thin till and rock ridges. The bedrock type in this basin is migmitite (0-30% mafic).
Crayfish Species	*Cambarus bartoni* and *Orconectes virilis.*
Stresses	
Acidification:	The lake is rated as extremely sensitive to acid loading (Alkalinity = 9.0 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 3.5 m) and the chemical parameter total phosphorus (ice-free mean value = 10.2 $\mu eq \cdot L^{-1}$) indicate that Crosson Lake is mesotrophic.
Site #1 COB PEB CSD LOS	shoreline - mostly boulders & bedrock, T-brush, hemlocks, large pines, balsam firs, oaks and ferns. substrate - rocks & PEB (45% of the site), sand (45%), macros (5%) and 5% detritus.
Site #2 LOS COB CSD	shoreline - large rocks, T-brush, hemlocks, birches, oaks and floating logs. substrate - logs/sticks (60% of the site), detritus (20%), rock (10%), sand (5%) and 5% macros.
Site #3 CSD LOS	shoreline - T-brush, floating logs, birch, balsam fir and large pine trees. substrate - sand (60% of the site), detritus (20%), sticks (10%) and 10% macros (lily pads).
Site #4 CSD LOS	shoreline - marsh like area (T-brush back about 40'), cedar, tall pines, hemlock, birch and floating logs. substrate - sand (30% of the site), sticks (30%), detritus (30%) and 10% macros (arrowheads & lily pads).
Site #5 LOS COB CSD	shoreline - mostly hemlock, two yellow birches, ferns, and fallen trees. substrate - detritus (50% of the site), macros (20%), rocks (10%), sand (10%) and 10% sticks.

DELANO LAKE

Drainage System	Upper Madawaska River drainage watershed (2KD1). The lake flows through Cache Lake and into the Upper Madawaska River. The Madawaska River flows east through a series of lakes to enter the Ottawa River at Arnprior.
Geology	The surficial cover consist of bedrock knobs and ridges with very thin, discontinuous drift cover (56.4%). Adjacent areas of thin drift with numerous outcrops (12.0% of the area) are accompanied by glaciofluvial outwash (12.7%). Organic depositions (8.8%) follow Delano Creek from the one pond (0.4% of the area) to Delano Lake. The bedrock geology consists of granite, gneiss, quartzose sandstone, syenitic and associated alkalic rocks (76.1% of the land area).
Crayfish Species	*Cambarus bartoni, Orconectes propinquus* and *Orconectes virilis.*
Stresses	
Acidification:	The lake is rated as moderately sensitive to acid loading (Alkalinity = 46 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 3.8 m) and the chemical parameter total phosphorus (ice-free mean value = 7.1 $\mu eq \cdot L^{-1}$) indicate that Delano Lake is oligotrophic.
Site #1 LOS	shoreline - floating logs with sphagnum, leather leaf, black spruce and cedar trees. substrate - macrophytes (50% of the site), and 50% detritus.
Site #2 LOS COB	shoreline - leather leaf, cedar and hemlock trees. substrate - detritus (60% of the site), sticks (30%) and 10% rocks.
Site #3 LOS	shoreline - leather leaf, cedar and hemlock trees. substrate - detritus (70% of the site) and 30% sticks.
Site #4 LOS	shoreline - leather leaf, balsam fir and hemlock trees. substrate - detritus (90% of the site) and 10% sticks.
Site #5 BOU LOS	shoreline - leather leaf along shore, accompanied by hemlock trees. substrate - BOU (80% of the site) and 20% detritus.

HAMER LAKE

Drainage System	Lake Rosseau drainage watershed (2EB5). The outflow enters Silver Lake which flows south-east into Gordon Bay on Lake Joseph.
Geology	The bedrock geology of this watershed consists of granite, gneiss, quartzose sandstone, syenitic and associated alkalic rocks.
Crayfish Species	*Orconectes virilis.*
Stresses Acidification:	The lake is rated as extremely sensitive to acid loading (Alkalinity = 7.2 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 1.8 m) and the chemical parameter total phosphorus (ice-free mean value = 11.3 $\mu eq \cdot L^{-1}$) indicate that Hamer Lake is mesotrophic.
Site #1 LOS	shoreline - grasses, labrador tea, several dead trees, pine and birch trees. substrate - detritus (60%), Eriocaulon and arrow heads (35%) and 5% logs.
Site #2 LOS CSD	shoreline - submerged ferns, labrador tea, floating grasses, logs, dead fallen trees, pine, hemlock and snull pie/hemlock trees. substrate - macros: lilypads and Eriocaulon (40%), detritus (25%), sand (20%) and 15% logs.
Site #3 BDR	shoreline - labrador tea, grasses, floating logs, large rocks, hemlock and white pine trees. substrate - macros: arrow-head and Eriocaulon (40%), rock shelf (30%), BDR (20%) and 10% logs.
Site #4 SLT LOS COB	shoreline - few rocks along shoreline, labrador tea, grasses, white pines, oaks and maple. substrate - SLT/detritus (40%), macrophytes Ericocaulon (40%), rocks (10%) and 10% sticks.
Site #5 LOS	shoreline - tall pines, hemlock trees, labrador tea, grasses, ferns, birch trees, floating logs and several dead trees. substrate - detritus (50%), sticks/logs (25%) and macros: lilypads (25%).

HARP LAKE

Drainage System	Upper North Branch Muskoka River drainage watershed (2EB13). The outflow enters Peninsula Lake which flows south-west to Fairy Lake. Fairy Lake then flows into the North Branch Muskoka River. The Muskoka and Moon River system finally enters into Georgian Bay on Lake Huron.
Geology	Minor till plain is the major surficial deposit at Harp Lake. The bedrock geology in this basin consist of granitized biotite and hornblende gneiss, diorite and amphibolite and schist.
Crayfish Species	*Cambarus bartoni* and *Orconectes propinquus.*
Stresses	
Acidification:	The lake is rated as moderately sensitive to acid loading (Alkalinity = 68 μeq $\cdot$L^{-1}).
Eutrophication:	Secchi depth measurements (mean value = 3.8 m) and the chemical parameter total phosphorus (ice-free mean value = 7.1 μeq $\cdot$L^{-1}) indicate that Harp Lake is oligotrophic.
Site #1 LOS CSD	shoreline - t-brush, birch and balsam fir trees. substrate - detritus (35% of the site), macros (Eriocaulon, Lobelia and arrow heads, 25% coverage) and 20% sand.
Site #2 COB CSD	shoreline - rock face (15' high), hemlock, birch and pine trees. substrate - rocks and COB (65% of the site), sand (30%) and 5% macros (Eriocaulon).
Site #3 CSD COB	shoreline - brush, old stumps, cedar, pine, hemlock and birch trees. substrate - sand (70% of the site), rocks (20%), sticks (5%) and 5% macros (Eriocaulon).
Site #4 CSD COB	shoreline - t-brush, floating logs, yellow birch, cedar and balsam firs. substrate - sand (40% of the site), macros (Eriocaulon coverage 40%), rocks (10%) and 10% sticks.
Site #5 LOS COB PEB CSD	shoreline - hemlock, yellow birch, white birch and cedar trees. substrate - sticks & logs (40% of the site), detritus (25%), rocks/PEB (20%), macros (10%) and 5% sand.

PINCHER LAKE

Drainage System	Moon River and Go Home River watershed (2EB13). The outflow runs southwest to Clara Lake which flows through a series of lakes which eventually leads to Lake Huron.
Geology	The surficial cover is dominated (61.8% of the area) by bedrock knobs and ridges, with very thin discontinuous drift cover. Sections of till account for 19.1% of the watershed. Pond areas cover 2.4%, and swamp and organic deposits cover 2.7% of the watershed. The bedrock geology consists of granite, gneiss, quartzose sandstone, syenitic and associated alkalic rocks (96.7% of the land area).
Crayfish Species	*Cambarus bartoni.*
Stresses	
Acidification:	The lake is rated as extremely sensitive to acid loading (Alkalinity = -1 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 5.3 m) and the chemical parameter total phosphorus (ice-free mean value = 7.5 $\mu eq \cdot L^{-1}$) indicate that Pincher Lake is oligotrophic.
Site #1 COB LOS	shoreline - leather leaf, cedar, black spruce and tamarack trees. substrate - rocks (40% of the site), detritus (30%) and 30% sticks.
Site #2 LOS	shoreline - leather leaf. substrate - detritus (80% of the site), and 20% sticks.
Site #3 LOS CSD COB	shoreline - leather leaf, hemlock, cedar and black spruce. substrate - detritus (50% of the site), sand (20%), rocks (10%), sticks (10%) and 10% macrophytes.
Site #4 LOS COB	shoreline - leather leaf, hemlock, cedar and black spruce. substrate - detritus (55% of the site), sticks (40%) and 5% rocks.
Site #5 LOS	shoreline - leather leaf and cedar trees. substrate - logs/sticks (60% of the site), and 40% detritus.

PLASTIC LAKE

Drainage System	Cameron Lake drainage watershed (2HF10). The outflow runs south to St. Nora Lake. St. Nora Lake eventually flows through Boshkung, Mountain and Horseshoe Lakes en route to the Gull River which eventually reaches Lake Simcoe and then Georgian Bay in Lake Huron (Girard et al. 1985).
Geology	The surficial cover of the watershed is dominated by a shallow, discontinuous, sand basal till containing angular to sub-angular boulders (Girard et al. 1985). The bedrock is an erosion and weather resistant gneiss, with a substantial igneous component. A small meta-gabbro plug appears on the east shoreline of the lake.
Crayfish Species	No crayfish were caught in the 1988 study .
Stresses Acidification:	The lake is rated as extremely sensitive to acid loading (Alkalinity = 12 $\mu eq \cdot L^{-1}$).
Eutrophication:	Cultural eutrophication is not a stress. Secchi depth measurements (mean value = 6.1 m) and the chemical parameter total phosphorus (ice-free mean value = 5.1 $\mu eq \cdot L^{-1}$) indicate that Plastic Lake is oligotrophic.
Site #1 COB LOS CSD	shoreline - medium size rocks, "dead heads", white pine, cedars and white birch. substrate - rocks/sticks (50%), detritus (20%), sand (10%) and 10% macrophytes Eriocaulon.
Site #2 LOS	shoreline - labrador tea, flat rock, large dead trees and saplings of white pine. substrate - mixture of LOS and detritus, accompanied with 60% macrophytes.
Site #3 LOS	shoreline - located near the mouth of the stream (pc1). The shoreline consists of large flat rocks with lots of vegetation (several species of grasses). substrate - logs (40% of the site) and 30% macrophyte Eriocaulon.
Site #4 COB CSD SLT	shoreline - rocky bottom accompanied by "dead heads". The type of trees to be seen were hemlock, white pine, cedar and labrador tea (type of shrub). substrate - rocks (50%), sand/SLT (20%), macrophytes (20%) and

10% logs/boulders.

Site #5 LOS COB BOU	shoreline - The shoreline contains bedrock up to the waterline. The types of trees to be seen were hemlocks and large white pines. substrate - logs/sticks (50%), rocks/BOU (30%) and 20% macrophytes.

SKIDWAY LAKE

Drainage System	Moon River and Go Home River watershed (2EB2). The outflow runs south to Code Lake and eventually drains into Lake Huron via a variety of small lakes.
Geology	The surficial cover is dominated by thin drift (83.3%), while the remaining 16.7% is lake surface area. The bedrock geology in this watershed consists of granite, gneiss, quartzose sandstone, syenitic and associated alkalic rocks (100% of the land area).
Crayfish Species	*Orconectes virilis.*
Stresses	
Acidification:	The lake is rated as extremely sensitive to acid loading (Alkalinity = -4.8 $\mu eq \cdot L^{-1}$).
Eutrophication:	Cultural eutrophication is not a stress. Secchi depth measurements (mean value = 4.4 m) and the chemical parameter total phosphorus (ice-free mean value = 6.7 $\mu eq \cdot L^{-1}$) indicate that Skidway Lake is oligotrophic.
Site #1 LOS	shoreline - leather leaf, hemlock and red oak trees. substrate - detritus (90% of the site), and 10% sticks/logs.
Site #2 LOS	shoreline - stumps, sticks, hard stem bulrush and hemlock trees. substrate - hard stem bulrush (50% of the site).
Site #3 LOS	shoreline - leather leaf, hemlock and red oak trees. substrate - detritus (65% of the site), and 35% sticks.
Site #4 LOS	shoreline - water lily, arrow heads, leather leaf, white pine and hemlock trees. substrate - detritus (70% of the site), sticks (20%) and 10% macrophytes.
Site #5 LOS CSD	shoreline - leather leaf flood plain with sticks and logs. substrate - detritus and sand.

WESTWARD LAKE

Drainage System	Oxtongue River drainage watershed (2EB11). Westward flows through a pond and enters the Oxtongue River. The flow then continues through to Lake of Bays and into the South Muskoka River. The Muskoka and Moon River system finally enters into Georgian Bay on Lake Huron.
Geology	The surficial cover is dominated by bedrock knobs and ridges with very thin, discontinuous drift (49.4%). Adjacent areas of thin drift with numerous outcrops (17.6% of the area) are accompanied by glaciofluvial outwash (4.9%). The only pond which is located at the north end of Westward Lake accounts for 0.5% of the watershed. The bedrock geology consists of granite, gneiss, quartzose sandstone, syenitic and associated alkalic rocks (93.1% of the land area).
Crayfish Species	*Cambarus bartoni* and *Orconectes propinquus.*
Stresses	
Acidification:	The lake is rated as moderately sensitive to acid loading (Alkalinity = 42.1 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 6.4 m) and the chemical parameter total phosphorus (ice-free mean value = 4.4 $\mu eq \cdot L^{-1}$) indicate that Westward Lake is oligotrophic.
Site #1 LOS CSD	shoreline - cedar and black spruce trees. substrate - thin veneer detritus (50% of the site), sticks/logs (30%) and 20% exposed sand.
Site #2 LOS	shoreline - cedar and black spruce trees. substrate - sticks/logs (100% of the site detritus).
Site #3 CSD LOS COB	shoreline - cedar trees. substrate - sand (40% of the site), detritus (40%), rocks (10%) and 10% sticks/logs.
Site #4 COB CSD	shoreline - leather leaf and black spruce trees. substrate - rocks (80% of the site), sand (10%) and 10% sphagnum moss.
Site #5 LOS COB	shoreline - leather leaf, cedar, white pine and black spruce trees. substrate - detritus, logs/sticks and rocks (percentages unknown).

YOUNG LAKE

Drainage System	Skeleton River drainage watershed (2EB7). The outflow joins Skeleton River which flows into Skeleton Bay on Lake Rosseau.
Geology	The bedrock geology in this watershed consists of granite, gneiss, quartzose sandstone, syenitic and associated alkalic rocks.
Crayfish Species	*Cambarus bartoni* and *Orconectes propinquus*.
Stresses	
Acidification:	The lake is rated as moderately sensitive to acid loading (Alkalinity = 90.2 $\mu eq \cdot L^{-1}$).
Eutrophication:	Secchi depth measurements (mean value = 5.7 m) and the chemical parameter total phosphorus (ice-free mean value = 7.5 $\mu eq \cdot L^{-1}$) indicate that Young Lake is oligotrophic.
Site #1 CSD PEB SLT LOS	shoreline - grasses, white pine, birch, cedar, balsam fir and maple trees. substrate - macros (Eriocaulon mats, coverage 40%), sand/PEB (30%), SLT/detritus (25%) and 5% sticks.
Site #2 CSD LOS	shoreline - t-brush, floating logs, white pine, oak, birch and balsam fir trees. substrate - sand (85% of the site), detritus (10%) and 5% sticks.
Site #3 CSD LOS	shoreline - floating logs, cedar, birch, white pine and hemlock trees. substrate - sand (80% of the site), detritus (10%), sticks/logs (5%) and 5% macrophytes (Eriocaulon).
Site #4 SLT LOS	shoreline - t-brush, grasses, floating logs, cedar, birch and hemlock trees. substrate - SLT/detritus (45% of the site), macros (reeds and Eriocaulon mats, coverage 45%) and 10% logs.
Site #5 CSD LOS	shoreline - t-brush, white pine, cedar, birch and hemlock trees. substrate - sand (50% of the site), detritus (40%) and 10% logs/sticks.

APPENDIX 4

TAXONOMIC LIST AND ASSOCIATED DATABASE CODES

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
1	2026	COELENTERATA	HYDROZOA	HYDROIDA		HYDRIDAE			HYDRA		
100	2119	PLATYHELMINTHES	TURBELLARIA								
102	2123	PLATYHELMINTHES	TURBELLARIA	TRICLADIDA		PLANARIIDAE			DUGESIA		TIGRINA
200	2103	NEMATODA									
202	2106	NEMATODA		MONONCHIDA		MONONCHIDAE			ANATONCHUS		
203	2109	NEMATODA	ADENOPHOREA	DORYLAIMIDA	DORYLAIMINA	DORYLAIMIDAE			DORYLAIMUS		
204	2136	NEMATODA	ADENOPHOREA	ENOPLIDA	MERMITHOIDEA	MERMITHIDAE			DIVISPICULIMERIS		
206	2111	NEMATODA	ADENOPHOREA	ENOPLIDA	MERMITHOIDEA	MERMITHIDAE			HYDROMERMIS		
208	2112	NEMATODA	ADENOPHOREA	ENOPLIDA	MERMITHOIDEA	MERMITHIDAE			LIMNOMERMIS		
210	2108	NEMATODA	ADENOPHOREA	ENOPLIDA	MERMITHOIDEA	MERMITHIDAE			MERMITHIDAE		
212		NEMATODA	ADENOPHOREA	DORYLAIMIDA	DORYLAIMINA	DORYLAIMIDAE			PARACTINOLAIMUS		
300	263	ANNELIDA	OLIGOCHAETA								
302	237	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			ARCTEONAIS		LOMONDI
303	278	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		TUBIFICIDAE			AULODRILUS		PIGUETI
304	224	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		ENCHYTRAEIDAE			CERNOSVITOVIELLA		
305	227	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		TUBIFICIDAE			ILYODRILUS		TEMPLETONI
306	273	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		TUBIFICIDAE			LIMNODRILUS		CLAPAREDEIANUS
308	277	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		TUBIFICIDAE			LIMNODRILUS		HOFFMEISTERI
310	223	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		TUBIFICIDAE			LIMNODRILUS		UDEKEMIANUS
312	270	ANNELIDA	OLIGOCHAETA	LUMBRICULIDA		LUMBRICULIDAE			LUMBRICULUS		VARIEGATUS
314	267	ANNELIDA	OLIGOCHAETA	LUMBRICULIDA		LUMBRICULIDAE			LUMBRICULUS		
315	230	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			NAIS		COMMUNIS
316	259	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			NAIS		PSEUDOBTUSA
317	258	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			NAIS		SIMPLEX
318	235	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			STYLARIA		LACUSTRIS
319	240	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			SLAVINA		APPENDICULATA
320	268	ANNELIDA	OLIGOCHAETA	LUMBRICULIDA		LUMBRICULIDAE			STYLODRILUS		HERINGIANUS
322	239	ANNELIDA	OLIGOCHAETA	TUBIFICIDA		TUBIFICIDAE			TASSERKIDRILUS		HARMANI
324	2137	ANNELIDA	OLIGOCHAETA	TUBIFICIDA		TUBIFICIDAE			TUBIFICIDAE		
326	2138	ANNELIDA	OLIGOCHAETA	TUBIFICIDA		TUBIFICIDAE					
327	246	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			UNCINAIS		UNCINATA
328	233	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			VEJDOVSKYELLA		COMATA
329	256	ANNELIDA	OLIGOCHAETA	HAPLOTAXIDA		NAIDIDAE			NAIS		VARIABILIS
400	207	ANNELIDA	HIRUDINEA								
402	199	ANNELIDA	HIRUDINEA	PHARYNGOBDELLIDA		ERPOBDELLIDAE			ERPOBDELLA		PUNCTATA
404	214	ANNELIDA	HIRUDINEA			GLOSSIPHONIIDAE			GLOIOBDELLA		ELONGATA
405	195	ANNELIDA	HIRUDINEA			GLOSSIPHONIIDAE			GLOSSIPHONIA		COMPLANATA
406	211	ANNELIDA	HIRUDINEA	GNATHOBDELLIDA		HIRUDINIDAE			HAEMOPIS		MARMORATA
408	216	ANNELIDA	HIRUDINEA			GLOSSIPHONIIDAE			HELOBDELLA		STAGNALIS
409	209	ANNELIDA	HIRUDINEA	GNATHOBDELLIDA		HIRUDINIDAE			MACROBDELLA		DECORA
410	201	ANNELIDA	HIRUDINEA	PHARYNGOBDELLIDA		ERPOBDELLIDAE			NEPHELOPSIS		OBSCURA
412	190	ANNELIDA	HIRUDINEA			GLOSSIPHONIIDAE			PLACOBDELLA		
414	188	ANNELIDA	HIRUDINEA			GLOSSIPHONIIDAE			PLACOBDELLA		MULTILINEATA
416	191	ANNELIDA	HIRUDINEA			GLOSSIPHONIIDAE			PLACOBDELLA		ORNATA
418	189	ANNELIDA	HIRUDINEA			GLOSSIPHONIIDAE			PLACOBDELLA		PICTA

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
500	621	ARTHROPODA	CRUSTACEA	PERACARIDA	ISOPODA						
502	622	ARTHROPODA	CRUSTACEA	PERACARIDA	ISOPODA	ASELLIDAE			ASELLUS		FORBESI
600	338	ARTHROPODA	CRUSTACEA	PERACARIDA	AMPHIPODA						
602	342	ARTHROPODA	CRUSTACEA	PERACARIDA	AMPHIPODA	CRANGONYCTIDAE			CRANGONYX		GRACILIS
604	619	ARTHROPODA	CRUSTACEA	PERACARIDA	AMPHIPODA	CRANGONYCTIDAE			CRANGONYX		LAURENTIANUS
606	339	ARTHROPODA	CRUSTACEA	PERACARIDA	AMPHIPODA	TALITRIDAE			HYALELLA		AZTECA
608	337	ARTHROPODA	CRUSTACEA	PERACARIDA	AMPHIPODA	PONTOPOREIIDAE			DIPOREIA		HOYI
700	2139	ARTHROPODA	CRUSTACEA	DECAPODA							
701	616	ARTHROPODA	CRUSTACEA	EUCARIDA	DECAPODA	CAMBARIDAE	CAMBARINAE		CAMBARUS		BARTONI
702	329	ARTHROPODA	CRUSTACEA	EUCARIDA	DECAPODA	CAMBARIDAE	CAMBARINAE		CAMBARUS	PUNCTICAMBARUS	ROBUSTUS
704	612	ARTHROPODA	CRUSTACEA	EUCARIDA	DECAPODA	CAMBARIDAE	CAMBARINAE		ORCONECTES		PROPINQUIS
706	613	ARTHROPODA	CRUSTACEA	EUCARIDA	DECAPODA	CAMBARIDAE	CAMBARINAE		ORCONECTES		VIRILIS
800	279	ARTHROPODA	ARACHNOIDEA	ACARIFORMES							
802	661	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	ARRENURIDAE			ARRENURUS	ARRENURUS	AMERICANUS
804	281	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	ARRENURIDAE			ARRENURUS	ARRENURUS	AURICULARIS
806	282	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	ARRENURIDAE			ARRENURUS	MEGARRENURUS	APETIOLATUS
808	662	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	ARRENURIDAE			ARRENURUS	MEGARRENURUS	CARDIACUS
810	659	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	ARRENURIDAE			ARRENURUS	MEGARRENURUS	MEGALURUS
812	323	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	HYDRODROMIDAE			ATRACTIDES		
814	320	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	UNIONICOLIDAE			HUITFELDTIA		RECTIPES
816	645	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	HYDRODROMIDAE			HYDRODROMA		AMERICANUS
817	649	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	HYDRODROMIDAE			HYDRODROMA		DESPICIENS
818	296	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	HYDRODROMIDAE			HYGROBATES		LONGIPALPIS
820	308	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	HYGROBATIDAE			HYGROBATES		NEOCALLIGER
822	651	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	LEBERTIIDAE			LEBERTIA		DISTINCTA
824	653	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	LIMNESIIDAE			LIMNESIA		MACULATA
826	648	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	LIMNESIIDAE			LIMNESIA		UNDULATA
827	654	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	LIMNOCHARIDAE			LIMNOCARES		
828	306	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	HYDRYPHANTIDAE			PSEUDOHYDRYPHANTES		ORBICULARIS
830	655	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	UNIONICOLIDAE			UNIONICOLA	CRASSIPES	LAURENTIANA
832	317	ARTHROPODA	ARACHNOIDEA	ACARIFORMES	PROSTIGMATA	ARRENURIDAE			ARRENURUS	MEGARRENURUS	BIRGEI
834	2140	ARTHROPODA	ARACHNIDA	HYDRACARINA	ARRENURIDAE				ARRENURUS	MEGALURACARUS	ELEVATUS
900	416	ARTHROPODA	INSECTA	COLLEMBOLA							
902	430	ARTHROPODA	INSECTA	COLLEMBOLA	ARTHROPLEONA	ISOTOMIDAE			FOLSOMIA		
904	421	ARTHROPODA	INSECTA	COLLEMBOLA	ARTHROPLEONA	PODURIDAE			HYPOGASTRURA		
905	2141	ARTHROPODA	INSECTA	COLLEMBOLA	ARTHROPLEONA	PODURIDAE			HYPOGASTRURA		VIATICA
906	422	ARTHROPODA	INSECTA	COLLEMBOLA	ARTHROPLEONA	ONYCHIURIDAE			ISOTOMURUS	HYDROISOTOMA	
908	2142	ARTHROPODA	INSECTA	COLLEMBOLA	ARTHROPLEONA	ISOTOMIDAE			METISOTOMA		
1000	1186	ARTHROPODA	INSECTA	EPHEMEROPTERA							
1002	1228	ARTHROPODA	INSECTA	EPHEMEROPTERA		HEPTAGENIIDAE	ARTHROPLEINAE		ARTHROPLEA		BIPUNCTATA
1004	2143	ARTHROPODA	INSECTA	EPHEMEROPTERA		CAENIDAE			CAENIS		DIMINUTA
1005	1156	ARTHROPODA	INSECTA	EPHEMEROPTERA		CAENIDAE			CAENIS		PUNCTATA
1006	1214	ARTHROPODA	INSECTA	EPHEMEROPTERA		LEPTOPHLEBIIDAE			CHOROTERPES		BASALIS
1007	1165	ARTHROPODA	INSECTA	EPHEMEROPTERA		BAETIDAE			CLOEON		RUBROPICTUM
1008	1280	ARTHROPODA	INSECTA	EPHEMEROPTERA		EPHEMERIDAE			EPHEMERA		SIMULANS
1009	2153	ARTHROPODA	INSECTA	EPHEMEROPTERA		EPHEMERELLIDAE			EURLYOPHELLA		LUTULENTA
1012	1299	ARTHROPODA	INSECTA	EPHEMEROPTERA		EPHEMERELLIDAE			EURYLOPHELLA		BICOLOR
1014	1273	ARTHROPODA	INSECTA	EPHEMEROPTERA		EPHEMERELLIDAE			EURYLOPHELLA		TEMPORALIS
1016	1281	ARTHROPODA	INSECTA	EPHEMEROPTERA		EPHEMERIDAE			HEXAGENIA		LIMBATA
1021	1162	ARTHROPODA	INSECTA	EPHEMEROPTERA		SIPHLONURIDAE	SIPHLONURINAE		SIPHLONURUS		ALTERNATUS
1024	1187	ARTHROPODA	INSECTA	EPHEMEROPTERA		METRETOPODIDAE			SIPHLOPLECTON		BASALE

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
1026	1227	ARTHROPODA	INSECTA	EPHEMEROPTERA		HEPTAGENIIDAE	HEPTAGENIINAE		STENACRON		INTERPUNCTATUM
1032	1199	ARTHROPODA	INSECTA	EPHEMEROPTERA		LEPTOPHLEBIIDAE			LEPTOPHLEBIA		INTERMEDIA
1100	1577	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	AESHNIDAE					
1101	1498	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	AESHNIDAE	AESHNINAE		AESHNA		CANADENSIS
1102	1495	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	AESHNIDAE	AESHNINAE		AESHNA		EREMITA
1104	1573	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	AESHNIDAE	AESHNINAE		AESHNA		UMBROSA
1105	1590	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			ARGIA		VIOLACEA
1106	1503	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	AESHNIDAE	GOMPHAESCHINAE		BASIAESCHNA		JANATA
1108	1501	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	AESHNIDAE	GOMPHAESCHINAE		BOYERIA		GRAFIANA
1109	1559	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	LIBELLULIDAE			CELITHEMIS		EPONINA
1110	1481	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			CHROMAGRION		CONDITUM
1112	1487	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	CORDULEGASTRIDAE			CORDULEGASTER		
1114	1561	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	CORDULIIDAE			CORDULIA		SHURTLEFFI
1116	1523	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	MACROMIIDAE			DIDYMOPS		TRANSVERSA
1117	2144	ARTHROPODA	INSECTA	ODONATA		GOMPHIDAE			DROMOGOMPHUS		SPINOSUS
1118	1591	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			ENALLAGMA		CYATHIGERUM
1119	1592	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			ENALLAGMA		BOREALE
1120	1596	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			ENALLAGMA		EXSULANS
1122	1461	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			ENALLAGMA		HAGENI
1124	1462	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			ENALLAGMA		VESPERUM
1126	1539	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	GOMPHIDAE	HAGENIINAE		HAGENIUS		BREVISTYLUS
1128	1544	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	GOMPHIDAE	GOMPHINAE		GOMPHUS	GOMPHUS	EXILIS
1130	1474	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	COENAGRIIDAE			ISCHNURA		VERTICALIS
1132	1492	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	LIBELLULIDAE			LIBELLULA		JULIA
1133	1470	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	LESTIDAE			LESTES		DISJUNCTUS
1134	1469	ARTHROPODA	INSECTA	ODONATA	ZYGOPTERA	LESTIDAE			LESTES		VIGILAX
1135	1493	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	LIBELLULIDAE			LIBELLULA		QUADRIMACULATA
1136	1581	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	LIBELLULIDAE			LEUCORRHINIA		FRIGIDA
1138	1494	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	LIBELLULIDAE			LEUCORRHINIA		HUDSONICA
1140	1579	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	LIBELLULIDAE			LIBELLULA		INCESTA
1142	1518	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	CORDULIIDAE			SOMATOCHLORA		WILLIAMSONI
1144	1519	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	CORDULIIDAE			EPITHECA		CYNOSURA
1146	1524	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	MACROMIIDAE			MACROMIA		ILLINOIENSIS
1148	2145	ARTHROPODA	INSECTA	ODONATA		AESHNIDAE			NASIAESCHNA		PENTACA
1150	1565	ARTHROPODA	INSECTA	ODONATA	ANISOPTERA	CORDULIIDAE			SOMATOCHLORA		CINGULATA
1200	1613	ARTHROPODA	INSECTA	PLECOPTERA							
1201	1650	ARTHROPODA	INSECTA	PLECOPTERA		PERLODIDAE	ISOPERLINAE		ISOPERLA		MARLYNIA
1202	1698	ARTHROPODA	INSECTA	PLECOPTERA		NEMOURIDAE			NEMOURA		TRISPINOSA
1204	2159	ARTHROPODA	INSECTA	PLECOPTERA		NEMOURIDAE	NEMOURINAE		SOYEDINA		
1300	1402	ARTHROPODA	INSECTA	HEMIPTERA		BELOSTOMATIDAE					
1301	1381	ARTHROPODA	INSECTA	HEMIPTERA		NOTONECTIDAE			BUENOA		MACROTIBIALIS
1302	1455	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			CENOCORIXA		
1303	1404	ARTHROPODA	INSECTA	HEMIPTERA		BELOSTOMATIDAE			BELOSTOMA		FLUMINIUM
1304	2146	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			CORIXIDAE		
1306	1425	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			HESPEROCORIXA		ATOPODONTA
1308	1437	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			HESPEROCORIXA		KENNICOTTI
1310	1416	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			HESPEROCORIXA		LOBATA
1312	1335	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			HESPEROCORIXA		MICHIGANENSIS
1314	1418	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			HESPEROCORIXA		VULGARIS
1315	1346	ARTHROPODA	INSECTA	HEMIPTERA		BELOSTOMATIDAE			LETHOCERUS		AMERICANUS
1316	1382	ARTHROPODA	INSECTA	HEMIPTERA		NOTONECTIDAE			NOTONECTA		INSULATA

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
1318	1384	ARTHROPODA	INSECTA	HEMIPTERA		NOTONECTIDAE			NOTONECTA		UNDULATA
1319	1432	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			PALMACORIXA		BUENOI
1320	1417	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	ARCTOSIGARA	DECORATELLA
1321	1395	ARTHROPODA	INSECTA	HEMIPTERA		NEPIDAE			RANATRA		FUSCA
1322	1423	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	ARCTOSIGARA	PENNIENSIS
1324	1341	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	PHAEOSIGARA	COMPRESSOIDEA
1326	1340	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	PHAEOSIGARA	MACKINACENSIS
1328	1426	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	PHAEOSIGARA	MACROPALA
1329	2147	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	PHAEOSIGARA	MISSISSIPPIENSIS
1330	1410	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	PILEOSIGARA	DOUGLASENSIS
1332	1436	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	VERMISIGARA	DEFLECTA
1334	1421	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	VERMISIGARA	JOHNSONI
1335	1419	ARTHROPODA	INSECTA	HEMIPTERA		CORIXIDAE			SIGARA	VERMICORIXA	MULLETTENSIS
1400	2157	ARTHROPODA	INSECTA	MEGALOPTERA							
1402	1615	ARTHROPODA	INSECTA	MEGALOPTERA		CORYDALIDAE			CHAULIODES		
1404	1616	ARTHROPODA	INSECTA	MEGALOPTERA		SIALIDAE			SIALIS		
1500	1604	ARTHROPODA	INSECTA	NEUROPTERA		HEMEROBIIDAE					
1502	1601	ARTHROPODA	INSECTA	NEUROPTERA		SISYRIDAE			CLIMACIA		AREOLARIS
1600	1715	ARTHROPODA	INSECTA	TRICHOPTERA							
1602	1713	ARTHROPODA	INSECTA	TRICHOPTERA		SERICOSTOMATIDAE			AGARODES		DISTINCTUS
1603	1807	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYOANEINAE		AGRYPNIA		IMPROBA
1604	1773	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYGANEINAE		AGRYPNIA		VESTITA
1605	1804	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYGANEINAE		AGRYPNIA		STRAMINEA
1608	1811	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYGANEINAE		BANKSIOLA		SMITHI
1609	1808	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYGANEINAE		BANKSIOLA		CROTCHI
1610	1864	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	ARTHRISPINDINI	CERACLEA		ALCES
1611	1810	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYGANEINAE		BANKSIOLA		DOSSUARIA
1612	1937	ARTHROPODA	INSECTA	TRICHOPTERA		HYDROPTILIDAE	HYDROPTILINAE		HYDROPTILA		
1613	1861	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	ARTHRISPINDINI	CERACLEA		
1614	1909	ARTHROPODA	INSECTA	TRICHOPTERA		LEPIDOSTOMATIDAE			LEPIDOSTOA		
1615	1925	ARTHROPODA	INSECTA	TRICHOPTERA		HYDROPSYCHIDAE	DIPLECTRONINAE		DIPLECTRONA		MODESTA
1616	1981	ARTHROPODA	INSECTA	TRICHOPTERA		PSYCHOMYIIDAE	PSYCHOMYIINAE		LYPE		DIVERSA
1618	1758	ARTHROPODA	INSECTA	TRICHOPTERA		MOLANNIDAE			MOLANNA		ULMERINA-UNIOPHILA
1619	1899	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE			LEPTOCERIDAE		
1620	1932	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	MYSTACIDINI	MYSTACIDES		SEPULCHRALIS
1622	1862	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	LEPTOCERINI	NECTOPSYCHE		
1624	2148	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	LEPTOCERINI	NECTOPSYCHE		SP. 2
1626	2149	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	LEPTOCERINI	NECTOPSYCHE		SP. 3
1627	1827	ARTHROPODA	INSECTA	TRICHOPTERA		LIMNEPHILIDAE	LIMNEPHILINAE	LIMNOPHILINI	NEMOTAULIUS		HOSTILIS
1628	1967	ARTHROPODA	INSECTA	TRICHOPTERA		POLYCENTROPODIDAE	POLYCENTROPODINAE		NYCTIOPHYLAX		AFFINIS
1630	1865	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	OECETINI	OECETIS		CINERASCENS
1632	1929	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	OECETINI	OECETIS		
1642	2150	ARTHROPODA	INSECTA	TRICHOPTERA		HYDROPTILIDAE	HYDROPTILINAE		OXYETHIRA		SP. 2
1644	2230	ARTHROPODA	INSECTA	TRICHOPTERA		HYDROPTILIDAE	HYDROPTILINAE		OXYETHIRA		SP. 3
1645	1799	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYGANEINAE		PHRYGANEA		
1646	2156	ARTHROPODA	INSECTA	TRICHOPTERA		HYDROPTILIDAE	HYDROPTILINAE		OXYETHIRA		SP. 4
1648	1983	ARTHROPODA	INSECTA	TRICHOPTERA		POLYCENTROPODIDAE	DISPSEUDOPSINAE		PHYLOCENTROPUS		
1650	1885	ARTHROPODA	INSECTA	TRICHOPTERA		LIMNEPHILIDAE	LIMNEPHILINAE	LIMNEPHILINI	PLATYCENTROPUS		
1652	2231	ARTHROPODA	INSECTA	TRICHOPTERA		POLYCENTROPODIDAE	POLYCENTROPODINAE		POLYCENTROPUS		SP. 1
1654	2232	ARTHROPODA	INSECTA	TRICHOPTERA		POLYCENTROPODIDAE	POLYCENTROPODINAE		POLYCENTROPUS		SP. 2

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DPONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
1636	1798	ARTHROPODA	INSECTA	TRICHOPTERA		PHRYGANEIDAE	PHRYGANEINAE		PTILOSTOMIS		OCELLIFERA
1658	1889	ARTHROPODA	INSECTA	TRICHOPTERA		LIMNEPHILIDAE	LIMNEPHILINAE	LIMNEPHILINI	PYCNOPSYCHE		
1662	1933	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	MYSTACIDINI	TRIAENODES		SP. 1
1664	1933	ARTHROPODA	INSECTA	TRICHOPTERA		LEPTOCERIDAE	LEPTOCERINAE	MYSTACIDINI	TRIAENODES		SP. 2
1666	1873	ARTHROPODA	INSECTA	TRICHOPTERA		LIMNEPHILIDAE			LIMNEPHILIDAE		
1700	2233	ARTHROPODA	INSECTA	LEPIDOPTERA							
1701	2236	ARTHROPODA	INSECTA	LEPIDOPTERA		PYRALIDAE	SCHOENOBIINAE		ACENTRIA		SP. 3
1702	2234	ARTHROPODA	INSECTA	LEPIDOPTERA		PYRALIDAE	SCHOENOBIINAE		ACENTRIA		SP. 1
1703	2235	ARTHROPODA	INSECTA	LEPIDOPTERA		PYRALIDAE	SCHOENOBIINAE		ACENTRIA		SP. 2
1704	1623	ARTHROPODA	INSECTA	LEPIDOPTERA		PYRALIDAE	CRAMBINAE		CRAMBUS		
1705	2237	ARTHROPODA	INSECTA	LEPIDOPTERA		PYRALIDAE	CRAMBINAE		CRAMBUS		SP. 2
1706	1705	ARTHROPODA	INSECTA	LEPIDOPTERA		GEOMETRIDAE			GEOMETRIDAE		
1708	2238	ARTHROPODA	INSECTA	LEPIDOPTERA		PYRALIDAE	NYMPHULINAE		EOPARARGYRACTIS		
1709	1621	ARTHROPODA	INSECTA	LEPIDOPTERA		PYRALIDAE	NYMPHYLINAE		PARAPONYX		
1800	2239	ARTHROPODA	INSECTA	COLEOPTERA							
1801	410	ARTHROPODA	INSECTA	COLEOPTERA		DYTISCIDAE			AGABUS		ANTHRACINUS
1802	2240	ARTHROPODA	INSECTA	COLEOPTERA		DYTISCIDAE			AGABUS		
1803	517	ARTHROPODA	INSECTA	COLEOPTERA		DYTISCIDAE			AGABUS		
1804	448	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			DINEUTUS		HORNI
1806	450	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			DINEUTUS		NIGRIOR
1808	571	ARTHROPODA	INSECTA	COLEOPTERA		CHRYSOMELIDAE			DONACIA		
1810	592	ARTHROPODA	INSECTA	COLEOPTERA		ELMIDAE			DUBIRAPHIA		MINIMA-VITTATA
1812	477	ARTHROPODA	INSECTA	COLEOPTERA		PSEPHENIDAE			ECTOPRIA		NERVOSA
1814	457	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			GYRINUS		AFFINIS
1815	362	ARTHROPODA	INSECTA	COLEOPTERA		DYTISCIDAE			GRAPHODERUS		LIBERUS
1816	461	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			GYRINUS		FROSTI
1817	2241	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			GYRINUS		AERATUS
1818	463	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			GYRINUS		LATILIMBUS
1820	462	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			GYRINUS	SAYI	(=LUGENS)
1822	442	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			GYRINUS		PECTORALIS
1824	467	ARTHROPODA	INSECTA	COLEOPTERA		GYRINIDAE			GYRINUS		VENTRALIS
1828	490	ARTHROPODA	INSECTA	COLEOPTERA		HALIPLIDAE			HALIPLUS		PANTHERINUS
1830	348	ARTHROPODA	INSECTA	COLEOPTERA		HYDROPHILIDAE			HYDROCHUS		
1832	374	ARTHROPODA	INSECTA	COLEOPTERA		DYTISCIDAE			HYDROPORUS	NEOPORUS	UNDULATUS
1834	527	ARTHROPODA	INSECTA	COLEOPTERA		ELMIDAE			MACRONYCHUS		GLABRATUS
1836	478	ARTHROPODA	INSECTA	COLEOPTERA		MELYRIDAE			MELYRIDAE		
1837	2242	ARTHROPODA	INSECTA	COLEOPTERA		STAPHYLINIDAE			PHYTOSUS		
1838	485	ARTHROPODA	INSECTA	COLEOPTERA		HELODIDAE			PRIONOCYPHON		
1840	2243	ARTHROPODA	INSECTA	COLEOPTERA		SCIRTIDAE			SCIRTES		SP. 1
1842	2244	ARTHROPODA	INSECTA	COLEOPTERA		SCIRTIDAE			SCIRTES		SP. 2
1844	2245	ARTHROPODA	INSECTA	COLEOPTERA		SCIRTIDAE			SCIRTES		SP. 3
1846	573	ARTHROPODA	INSECTA	COLEOPTERA		ELMIDAE			STENELMIS		CRENATA
1848	345	ARTHROPODA	INSECTA	COLEOPTERA		HYDROPHILIDAE			BEROSUS		
1850	390	ARTHROPODA	INSECTA	COLEOPTERA		DYTISCIDAE			COPTOTOMUS		LONGULUS
1852	480	ARTHROPODA	INSECTA	COLEOPTERA		HELODIDAE			CYPHON		
1854	347	ARTHROPODA	INSECTA	COLEOPTERA		HYDROPHILIDAE			TROPISTERNUS		MIXTUS
1856	525	ARTHROPODA	INSECTA	COLEOPTERA		ELATERIDAE			ELATERIDAE		

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
2000	433	ARTHROPODA	INSECTA	DIPTERA							
2100	882	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE					
2101	763	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		ALLUAUDOMYIA		
2102	754	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	FORCIPOMYIINAE		ATRICHOPOGON		POLYDACTYLUS
2104	2216	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 1
2106	2218	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 1A
2108	2219	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 2/2A
2110	2220	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 3
2112	2221	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 4
2114	2152	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 5
2116	2222	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 6
2117	2224	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 8
2118	2223	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		BEZZIA		SP. 7
2120	766	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		CULICOIDES		STELLIFER
2122	2225	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		CULICOIDES		SP. 1
2124	2226	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		CULICOIDES		SP. 2
2126	755	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	FORCIPOMYIINAE		FORCIPOMYIA		
2128	2227	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	DASYHELEINAE		DASYHELEA		SP. 1
2130	2228	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	DASYHELEINAE		DASYHELEA		SP. 2
2132	695	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		MALLOCHOHELEA		
2133	2229	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	DASYHELEINAE		DASYHELEA		SP. 3
2136	694	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE			MONOHELEA		
2140	696	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE			ISOHELEA		
2142	770	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PALPOMYIA		TIBIALIS
2144	771	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PALPOMYIA		SP.2
2146	2208	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PROBEZZIA		SP. 1
2148	2209	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PROBEZZIA		SP. 2
2150	2210	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PROBEZZIA		SP. 3
2152	2211	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PROBEZZIA		SP. 4
2153	2212	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PROBEZZIA		SP. 5
2154	683	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		STILOBEZZIA		
2155		ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CERATOPOGONIDAE	CERATOPOGONINAE		PROBEZZIA		SP. 6
2200	2003	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE					
2300	842	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	PODONOMINAE	PODONOMINI			
2302	724	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	PODONOMINAE	PODONOMINI	PAROCHLUS		KIEFFERI
2400	547	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE				
2401	898	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	ABLABESMYIA	ABLABESMYIA	MALLOCHI
2402	721	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	ABLABESMYIA	ABLABESMYIA	ASPERA
2403	2213	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE		ABLABESMYIA	ASAYIA	ANNULATA
2404	805	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	MACROPELOPIINI	APSECTROTANYPUS		JOHNSONI
2405	897	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	ABLABESMYIA	ABLABESMYIA	PARAJANTA
2406	546	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE		BRUNDINELLA		EUMORPHA
2407	2020	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	ABLABESMYIA	ABLABESMYIA	MONILIS
2408	549	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	COELOTANYPODINI	CLINOTANYPUS		PINGUIS
2409	2214	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE		ABLABESMYIA	KARELIA	ILLINOENSIS
2410	811	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	CONCHAPELOPIA		
2411	798	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	ABLABESMYIA	ABLABESMYIA	PEELENSIS
2412	548	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	MACROPELOPIINI	DJALMABATISTA		PULCHER
2414	809	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	GUTTIPELOPIA		GUTTIPENNIS
2416	552	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	LABRUNDINIA		PILOSELLA

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
2418	814	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	LABRUNDINIA		NEOPILOSELLA
2419	800	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	LABRUNDINIA		
2420	813	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	LARSIA		CANADENSIS
2422	550	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	LARSIA		INDISTINCTA
2424	812	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	NATARSIA		BALTIMOREUS
2426	802	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	MACROPELOPIINI	PROCLADIUS		
2428	796	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	THIENEMANNIMYIA		NORENA
2430	2018	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	PENTANEURINI	TRISSOPELOPIA		OGEMAWI
2432	2215	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE		ZAVRELIMYIA		SP. 1
2434	2203	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE		ZAVRELIMYIA		
2500	714	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	DIAMESINAE	DIAMESINI			
2501	802	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	TANYPODINAE	MACROPELOPIINI	PROCLADIUS		
2502	2204	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	DIAMESINAE		PROTANYPUS		RAMOSUS
2503	857	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	DIAMESINAE	PROTANYPINI	PROTANYPUS		RAMOSUS
2600	711	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	DIAMESINAE	PRODIAMENSINI			
2602	710	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	DIAMESINAE	PRODIAMENSINI	MONODIAMESA		BATHYPHILA
2700	840	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE				
2702	725	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		ACRIOTOPUS		
2704	839	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		BRILLIA		PARVA
2706	838	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		BRYOPHAENOCLADIUS		
2708	1327	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CORYNONEURA		LACUSTRIS
2710	1328	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CORYNONEURA		LOBATA
2711		ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		BRILLIA		FLAVIFRONS
2712	539	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CORYNONEURA		SCUTELLATA
2714	2205	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CORYNONEURA		SP. 1
2716	2206	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CORYNONEURA		SP. 2
2717	2207	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CORYNONEURA		SP. 3
2718	1711	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	CRICOTOPUS	ALBIFORCEPS
2719	1136	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS		
2720	500	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	CRICOTOPUS	CYLINDRACEUS
2722	502	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	CRICOTOPUS	FESTIVELLUS
2724	501	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	CRICOTOPUS	CURTUS
2726	438	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	CRICOTOPUS	TREMULUS
2728	437	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	ISOCLADIUS	INTERSECTUS
2730	823	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	ISOCLADIUS	LARICOMALIS
2732	2155	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	ISOCLADIUS	SP. 1
2733	2154	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		CRICOTOPUS	ISOCLADIUS	SP. 2
2734	1709	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		DIPLOCLADIUS		
2736	1708	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		DOITHRIX		SP. 1
2737	2190	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		EPOICOCLADIUS		SP. 1
2738	1708	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		DOITHRIX		SP. 2
2739	822	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		EPOICOCLADIUS		FLAVENS
2740	496	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		HELENIELLA		
2742	675	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		HETEROTANYTARSUS		NUDALUS
2744	676	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		HETEROTRISSOCLADIUS		CHANGI
2746	677	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		HETEROTRISSOCLADIUS		HIRTAPEX
2748	821	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		HYDROBAENUS		FUSISTYLUS
2749		ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		NANOCLADIUS		DISTINCTUS
2750	680	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		LIMNOPHYES		
2751	681	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		NANOCLADIUS	NANOCLADIUS	INCOMPTUS
2752	719	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		NANOCLADIUS	NANOCLADIUS	MINIMUS
2753		ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		NANOCLADIUS	PLECOPTERACOLUTHUS	DOWNSEI

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
2754	2191	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		NANOCLADIUS	NANOCLADIUS	
2755		ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARACRICOPTUS		
2756	1143	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		ORTHOCLADIUS	ORTHOCLADIUS	ANNECTENS
2757	2192	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARACLADIUS		
2758	2193	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARAKIEFFERIELLA		SP. 1
2759	2194	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARAKIEFFERIELLA		SP. 2
2760	2195	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARAKIEFFERIELLA		SP. 3
2761	2196	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARAKIEFFERIELLA		SP. 4
2762	1138	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARAMETRIOCNEMUS		LUNDBECKI
2764	1141	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARAPHAENOCLADIUS		NATHECUS
2766	1140	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PARAPHAENOCLADIUS		
2768	1144	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PLATYSMITTIA		
2769	2197	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSECTROCLADIUS	ALLOPSECTROCLADIUS	
2770	1727	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSECTROCLADIUS	MESOPSECTROCLADIUS	
2772	891	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSECTROCLADIUS	MONOPSECTROCLADIUS	CALCARATUS
2774	1729	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSECTROCLADIUS	PSECTROCLADIUS	LITOFILUS
2776	674	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSECTROCLADIUS	PSECTROCLADIUS	SIMULANS
2777	666	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSECTROCLADIUS	PSECTROCLADIUS	SORDIDELLUS
2778	1132	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSEUDORTHOCLADIUS		
2780	1131	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSEUDOSMITTIA		FORCIPATA
2781	2199	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSEUDOSMITTIA		SP. 2
2782	2198	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		PSEUDOSMITTIA		SP. 1
2784	667	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		RHEOCRICOTOPUS		
2786	1129	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		SMITTIA		
2788	1724	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		STACKELBERGINA		
2790	720	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		SYNORTHOCLADIUS		SEMIVIRENS
2792	1324	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		THIENEMANNIELLA		
2794	1325	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		TVETANIA		BAVARICA
2796	884	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		TVETANIA		DISCOLORIPES
2797	818	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		XYLOTOPUS		
2798	817	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		ZALUTSCHIA		OBSEPTA
2799	819	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	ORTHOCLADIINAE		ZALUTSCHIA		SP. 1
2800	1120	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE				
2900	1120	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI			
2902	1113	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	CLADOPELMA		
2904	793	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	CHIRONOMUS	CAMPTOCHIRONOMUS	TENTANS
2906	669	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	CHIRONOMUS		
2908	1999	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	CRYPTOCHIRONOMUS		CONUS
2910	2001	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	CRYPTOCHIRONOMUS		
2912	787	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	DEMICRYPTOCHIRONOM	IRMAKIA	CUNEATUS
2914	791	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	DICROTENDIPES		LEUCOSCELIS
2916	878	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	DICROTENDIPES		MODESTUS
2917	2200	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	DICROTENDIPES		NERVOSUS
2918	786	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	DICROTENDIPES		TRITOMUS
2920	876	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	ENDOCHIRONOMUS		NIGRICANS
2922	2201	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	GLYPTOTENDIPES		SP. 1
2923	2202	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	GLYPTOTENDIPES		SP. 2
2924	2177	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	GLYPTOTENDIPES		
2925	2178	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	KIEFFERULUS		DUX

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
2926	1119	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	LAUTERBORNIELLA		AGRAYLOIDES
2927		ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	GLYPTOTENDIPES		SP. 3
2928	1112	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	MICROTENDIPES		PEDELLUS
2930	784	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	NILOTHAUMA		BABIYI
2932	785	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	NILOTHAUMA		
2935	1117	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	OMISUS		CALEDONICUS
2936	783	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	OMISUS		PICA
2938	1125	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PAGASTIELLA		OSTANSA
2940	1127	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PARACHIRONOMUS		ABORTIVUS
2942	778	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PARACLADOPELMA		GALAPTERA
2944	690	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PARACLADOPELMA		UNDINE
2946	854	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PARACLADOPELMA		
2948	1106	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PARALAUTERBORNIELLA		NIGROHALTERALIS
2950	1319	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PARATENDIPES		ALBIMANUS
2952	1320	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PARATENDIPES		NUDISQUAMA
2954	693	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PHAENOPSECTRA		
2956	895	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	PENTAPEDILUM	SORDEN
2958	1323	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	PENTAPEDILUM	TRITUM
2960	691	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM		CONVICTUM
2962	2179	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM		SP. 1
2964	2180	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM		SP. 2
2966	2182	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM		SP. 3
2968	2183	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM		SP. 4
2970	779	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	TRIPODURA	SCALAENUM
2972	1321	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	TRIPODURA	SIMULANS
2974	855	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PSEUDOCHIRONOMUS		ARTICAUDUS
2975	2189	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PSEUDOCHIRONOMUS		SP. 1
2976	2163	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PSEUDOCHIRONOMUS		SP. 2
2977	2164	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PSEUDOCHIRONOMUS		SP. 3
2978	890	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	SERGENTIA		CORACINA
2979	2165	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PSEUDOCHIRONOMUS		SP. 4
2980	1105	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	STENOCHIRONOMUS		HILARIS
2982	879	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	STICTOCHIRONOMUS		SP.1/3
2984	692	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	PHAENOPSECTRA		FLAVIPES
2986	835	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	TRIBELOS		JUCUNDUM
2988	2167	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	ZAVRELIELLA		MARMORATA
2990	2185	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	POLYPEDILUM	FALLAX
2991	1322	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	POLYPEDILUM	ILLINOENSE
2992	2186	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	POLYPEDILUM	TRIGONUM
2993	2181	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM		SP. 2A
2994	2184	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM		SP. 5
2995	2187	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	TRIPODURA	SP. 1
2996	2166	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	STICTOCHIRONOMUS		SP. 2
2997	836	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	XENOCHIRONOMUS		XENOLABIS
2999	2188	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	CHIRONOMINI	POLYPEDILUM	TRIPODURA	SP. 2
3000	706	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI			
3002	867	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	CLADOTANYTARSUS		
3004	864	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	PARAPSECTRA		
3006	866	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	PARATANYTARSUS		
3008	873	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	STEMPELLINA		

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
3010	871	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	STEMPELLINELLA		
3012	700	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	TANYTARSUS		CURTICORNIS
3014	863	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	TANYTARSUS		
3016	2168	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	CHIRONOMIDAE		
3018	869	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHIRONOMIDAE	CHIRONOMINAE	TANYTARSINI	ZAVRELIA		
3100	731	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	TABANIDAE					
3102	961	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	TABANIDAE			CHRYSOPS		ATER
3103	831	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	TABANIDAE			CHRYSOPS		EXCITANS
3104	2169	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	TABANIDAE			CHRYSOPS		SP. 1
3106	2158	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	TABANIDAE			CHRYSOPS		
3108	2170	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	TABANIDAE			TABANUS		
3109	2171	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	TABANIDAE			TABANUS		MARGINALIS
3200	1237	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE					
3202	1258	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	LIMONIINAE		DACTYLOLABIS		
3204	1265	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	LIMONIINAE		HEXATOMA		
3206	1033	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	LIMONIINAE		LIMONIA		
3208	1145	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	LIMONIINAE		ERIOPTERA		
3210	1064	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	LIMONIINAE		ORMOSIA		
3211	1230	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	LIMONIINAE		PEDICIA		
3212	2172	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE			TIPULA		SP. 1
3214	1244	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	TIPULINAE		TIPULA	NIPPOTIPULA	ABDOMINALIS
3216	2173	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE			TIPULA	YAMATOTIPULA	
3217	2174	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE			TIPULIDAE		SP. 1
3218	2151	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE			TIPULIDAE		SP. 2
3220	1262	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	TIPULIDAE	LIMONIINAE		GONOMYIA		
3302	2176	ARTHROPODA	INSECTA	DIPTERA		CECIDOMYIIDAE			CECIDOMYIIDAE		
3306	716	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	DIXIDAE			DIXELLA		
3308	2128	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	DOLICHOPODIDAE			DOLICHOPODIDAE		
3310	827	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	EMPIDIDAE			HEMERODROMIA		
3311	940	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	EMPIDIDAE			EMPIDIDAE		
3312	2160	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	PHORIDAE			PHORIDAE		
3314	2161	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	PLATYPEZIDAE			PLATYPEZA		SP. 1
3316	2162	ARTHROPODA	INSECTA	DIPTERA	BRACHYCERA	PLATYPEZIDAE			PLATYPEZA		SP. 2
3318	1016	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	PTYCHOPTERIDAE			BATTACOMORPHA		
3320	1101	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	PSYCHODIDAE			PSYCHODIDAE		
3322	1238	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	THAUMALEIDAE			THAUMALEA		
3500	2027	MOLLUSCA	GASTROPODA								
3502	2064	MOLLUSCA	GASTROPODA	MESOGASTROPODA		HYDROBIIDAE			AMNICOLA		LIMOSA
3503	2061	MOLLUSCA	GASTROPODA	MESOGASTROPODA		VIVIPARIDAE			CAMPELOMA		DECISUM
3504	2036	MOLLUSCA	GASTROPODA	BASOMMATOPHORA		ANCYLIDAE			FERRISSIA		FRAGILIS
3505	2059	MOLLUSCA	GASTROPODA	BASOMMATOPHORA		PLANORBIDAE			GYRAULUS		PARVUS
3506	2040	MOLLUSCA	GASTROPODA	BASOMMATOPHORA		PSYSIDAE			PHYSELLA	PHYSELLA	GYRINA
3508	2044	MOLLUSCA	GASTROPODA	BASOMMATOPHORA		PLANORBIDAE			HELISOMA		ANCEPS
3510	2029	MOLLUSCA	GASTROPODA	BASOMMATOPHORA		PLANORBIDAE			PLANORBULA		CAMPESTRIS
3512	2060	MOLLUSCA	GASTROPODA	MESOGASTROPODA		VALVATIDAE			VALVATA		LEWISI
3600	2077	MOLLUSCA	PELECYPODA								
3602	2092	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		CASERTANUM
3604	2090	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		FERRUGINEUM
3606	2086	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		LILLJEBORGI
3608	2093	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		ADAMSI
3610	2080	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		NITIDUM

Appendix 4: Taxonomic List and associated database Codes

MOENUM	DFONUM	PHYLUM	CLASS	FIRSTORDER	SUBORDER	FAMILY	SUBFAMILY	TRIBE	GENUS	SUBGENUS	SPECIES
3612	2081	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		VARIABILE
3614	2089	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		EQUILATERALE
3616	2102	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	SPHAERIINAE		MUSCULIUM		SECURIS
3618	2083	MOLLUSCA	PELECYPODA	VENEROIDA		UNIONIDAE			ANODONTA		
3620	2088	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	PISIDIINAE		PISIDIUM		SUBTRUNCATUM
3622	2079	MOLLUSCA	PELECYPODA	VENEROIDA		SPHAERIIDAE	SPHAERIINAE		MUSCULIUM	LACUSTRE	JAYENSE
3700	760	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHAOBORIDAE					
3702	685	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHAOBORIDAE	CHAOBORINAE		CHAOBORUS	CHAOBORUS	AMERICANUS
3704	684	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHAOBORIDAE	CHAOBORINAE		CHAOBORUS	CHAOBORUS	FLAVICANS
3706		ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CHAOBORIDAE	CHAOBORINAE		CHAOBORUS	SAYOMYIA	PUNCTIPENNIS
3800	604	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CULICIDAE					
3801	2175	ARTHROPODA	INSECTA	DIPTERA	NEMATOCERA	CULICIDAE			MANSONIA		PERTUBANS

APPENDIX 8

TAXONOMIC REFERENCES

General Taxonomic References

Merritt, R.W. and K.W. Cummins. 1984. An introduction to the aquatic insects of North America (2nd edition). Kendall/Hunt Publ. Co., Dubuque, IA. 722 pp.

Peckarsky, B.L., P.R. Fraissinet, M.A. Penton and D.J. Conklin, Jr. 1990. Freshwater macroinvertebrates of Northeastern North America. Cornell University Press, Ithaca, N.Y. 442 pp.

Pennak, R.W. 1978. Freshwater invertebrates of the United States (2nd edition). John Wiley and Sons, New York, N.Y. 803 pp.

Thorp, J.H. and A.P. Covich (eds.). 1991. Ecology and classification of North American freshwater invertebrates. Academic Press, San Diego, CA. 874 pp.

Usinger, R.L. 1968. Aquatic insects of California with keys to North American genera and California species. Univ. Calif. Press, Berkeley, CA. 508 pp.

Specialized References

Oligochaeta

Brinkhurst, R.O. 1976. Aquatic Oligochaeta recorded from Canada and the St. Lawrence Great Lakes. Pac. Mar. Sci. Rpt. 76-4: 49 pp.

Brinkhurst, R.O. 1986. Guide to the freshwater aquatic microdrile oligochaetes of North America. Can. Spec. Publ. Fish. Aqu. Sci. 84. Scientific Information and Publication Branch, Ottawa, Ontario, Canada K1A 0E6. 259 pp.

Hiltunen, J.K. and D.J. Klemm. 1980. A guide to the Naididae (Annelida: Clitellata: Oligochaeta) of North America. EPA 600/4-80-031. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Monitoring and Support Laboratory, Cincinnati, OH. 48 pp.

Stimpson, K.S., D.J. Klemm and J.K. Hiltunen. 1982. A guide to the Tubificidae (Annelida: Clitellata: Oligochaeta) of North America. EPA 600/3-82-033. U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268. 61 pp.

Hirudinea

Klemm, D.J. 1982. Leeches (Annelida: Hirudinea) of North America. EPA 600/3-82-025. U.S. Environmental Protection gency, Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268. 177 pp.

Klemm, D.J. 1985. Freshwater leeches (Annelida: Hirudinea). In: D.J. Kelmm (ed.). A guide to the freshwater Annelida (Polychaeta, naidid and tubificid Oligochaeta and Hirudinea) or North America,. Kendall/Hunt Publ. Co. Dubuque, IA. pp. 70-173.

Amphipoda

Bousfield, E.L. 1958. Freshwater amphipod crustaceans of glaciated North America. Can. Field Nat. 72: 55-113.

Holsinger, J.R. 1976. The freshwater amphipod crustaceans (Gammaridae) of North America. EPA Water Poll. Control Res. Ser. 18050 ELD04/72. Cincinnati, OH. 80 pp.

Alker, E.M. and pp.S. Corbett. 1975. The Odonata of Canada and Alaska. Vol. 3. Univ. Toronto Press. Toronto, Ontario. 307 pp.

Alker, E.M. 1958. The Odonata of Canada and Alaska. Vol. 2. Univ. Toronto Press. Toronto, Ontario. 318 pp.

Alker, E.M. 1953. The Odonata of Canada and Alaska. Vol. 1. Univ. Toronto Press. Toronto, Ontario. 191 pp.

Cannings, A. and K.M. Stuart. 1977. The dragonflies of British Columbia. B.C. Prov. Mus. Hndk. No. 35. 256 pp.

Needham, J.G. and M.J. Westfall Jr. 1954. Dagonflies of North America (Anisoptera) including the Greater Antilles and the provinces of the Mexican border. Univ. Calif. Press. Berkeley, CA. 615 pp.

Burian, S.K. 1990. The mayflies (Ephemeroptera) of Maine: a faunal survey part I and taxonomy of the Leptophlebiidae, Potamanthidae, Polymiturcyidae and Ephemeridae, part II. PhD. thesis. Univ. Main. UMI No. 9034296. 408 pp.

Burks, B.D. 1953. The mayflies of Illinois. Bull. Ill. Nat. Hist. Surv. 26: 1-216.

Check, G.R. 1982. A revision of the North American species of *Callibbaetis* (Ephemeroptera: Baetidae). PhD. thesis. Univ. Minnesota. UMI No. 8308030. 164 pp.

Edmunds, G.F. Jr., S.L. Jensen and L. Berner. 1976. The mayflies of North and Central America. Univ. Minnesota Press. Minneapolis, MN. 330 pp.

McCafferty, W.P. 1975. The burrowing mayflies (Ephemeroptera: Ephemeroidea) of the United States. Trans. Am. Entomol. Soc. 101: 447-504.

Provonsha, A.V. 1990. A revision of the genus Caenis in North America (Ephemeroptera: Caenidae). Trans. Am. Entomol. Soc. 116: 801-884.

Baumann, R.W., A.R. Gaufin and R.F. Sardick. 1977. The stoneflies (Plecoptera) of the Rocky Mountains. Mem. Am. Entomol. Soc. 31: 1-208.

Dosdall, L. and D.M. Lemhkuhl. 1979. Stoneflies (Plecoptera) of Saskatchewan. Quaest. Entomol. 15: 3-116.

Frison, T.H. 1935. The stoneflies, or Plecoptera, of Illinois. Bull. Ill. Nat. Hist. Surv. 20: 281-371.

Harper, P.P. and H.B.N. Hynes. 1971. The Leuctridae of eastern Canada (Insecta: Plecoptera). Can. J. Zool. 49(6): 915-920.

Harper, P.P. and H.B.N. Hynes. 1971. The Capniidae of eastern Canada (Insecta: Plecoptera). Can. J. Zool. 49(6): 921-940.

Harper, P.P. and H.B.N. Hynes. 1971. The nymphs of the Taeniopterygidae of eastern Canada (Insecta: Plecoptera). Can. J. Zool. 49: 941-947.

Harper, P.P. and H.B.N. Hynes. 1971. The nymphs of the Nemouridae of eastern Canada (Insecta: Plecoptera). Can. J. Zool. 49: 1129-1142.

Hitchcock, S.W. 1974. Guide to the insects of Connecticut Part VII. The Plecoptera or stoneflies of Connecticut. Bull. State Geol. Nat. Hist. Surv. 107: 1-262.

Szczytko, S.W. and K.W. Stewart. 1979. The genus *Isoperla* (Plecoptera) of western North America. Holomorphology and systematics and a new stonefly genus *Cascadoperla*. Mem. Am. Entomol. Soc. 32: 1-119.

Trichoptera

Ross, H.H. 1944. The caddisflies, or Trichoptera, of Illinois. Bull. Ill. Nat. Hist. Surv. 23: 1-326.

Wiggins, G.R. 1977. Larvae of the North American caddisfly genera (Trichoptera). Univ. Toronto Press. Toronto, Ontario 401 pp.

Coleoptera

Bousquet, Y. (ed.). 1991. Checklist of beetles of Canada and Alaska. Agric. Can. Res. Br. Publ. 1861/E. 430 pp.

Brown, H.P. 1976. Aquatic dryopoid beetles (Coleoptera) of the United States. EPA Water Poll. Control Res. Ser. 18050 ELD04/74. U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268. 82 pp.

Oygur, S. 1988. Taxonomy, distribution and phenology of North America (north of Mexico) *Gyrinus* Geoffroy (Coleoptera: Gyrinidae). PhD. thesis. Rutgers, The State Univ. New Jersey. UMI No. 8914244. 313 pp.

Smetana, A. 1988. Review of the family Hyrophilidae of Canada and Alaska (Coleoptera). Mem. Entomol. Soc. Can. 142: 1-316 pp.

Diptera: Chironomidae

Oliver, D.R. and M.E. Roussel. 1983. The genera of larval midges of Canada (Diptera: Chironomidae). In The insects and arachnids of Canada, part II. Biosystematics Res. Inst. Ottawa, Ontario. Publ. 1746. 263 pp.

Wiederholm, T. (ed.). 1983. Chironomidae of the holarctic region. Keys and diagnoses. Part I. Larvae. Entomol. Scand. Suppl. 19: 1-457.

Burch, J.B. 1972. Freshwater *Sphaeriaean* clams (Mollusca: Pelecopoda) of North America. Biota of Freshwater Ecosystems Identification Manual No. 3. U.S. Environmental Protectiofn Agency, Washington, D.C. 31 pp.

Burch, J.B. 1973. Freshwater unionacean clams (Mollusca: Pelecopoda) of North America. Biota of Freshwater Ecosystems Identification Manual No. 11. U.S. Environmental Protection Agency, Washington, D.C. 176 pp.

Burch, J.B. 1982. Freshwater snails (Mollusca: Gastropoda) of North America. EPA 600/3-82-026. U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, OH. 294 pp.

Burch, J.B. 1989. North American freshwater snails. Malacological Publ. Ann Arbor, MI. 365 pp.

Clark, A.H. 1981. Freshwater molluscs of the Canadian Interior Basin. Malacologia. 13: 1-509.